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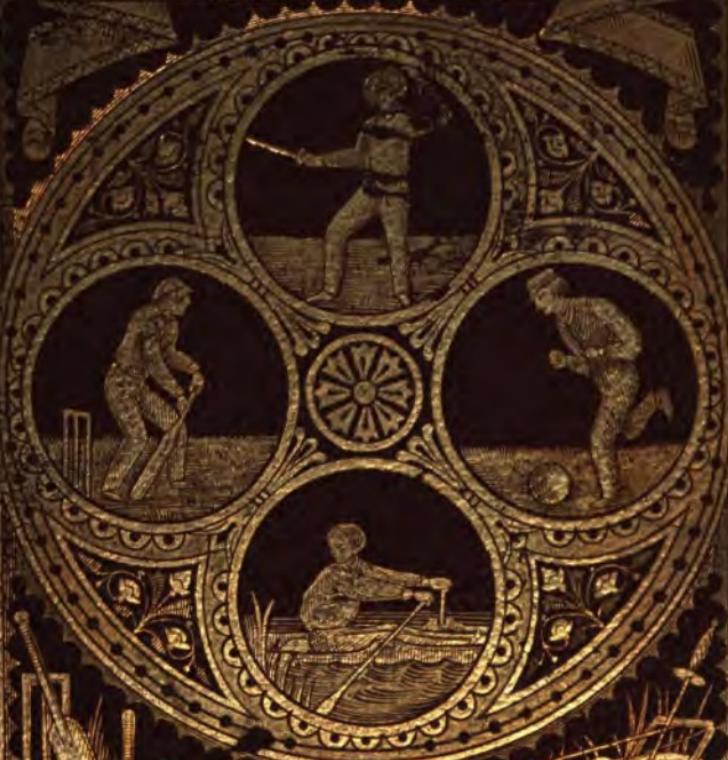
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THE BOY'S HOLIDAY BOOK





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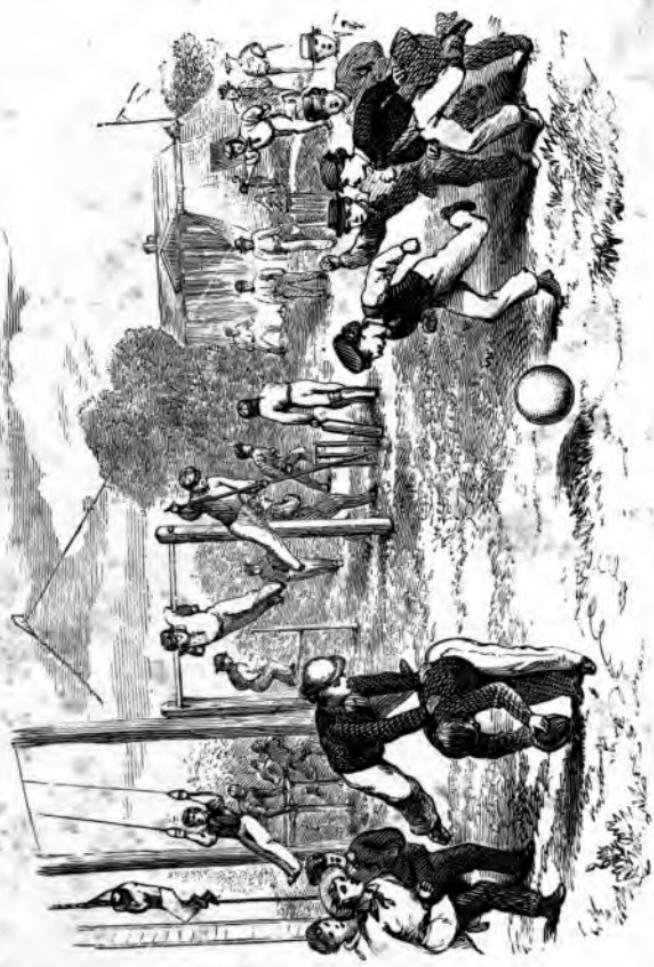
THE
BOY'S HOLIDAY BOOK.

BY
THE REV. T. E. FULLER.

PROFUSELY ILLUSTRATED.

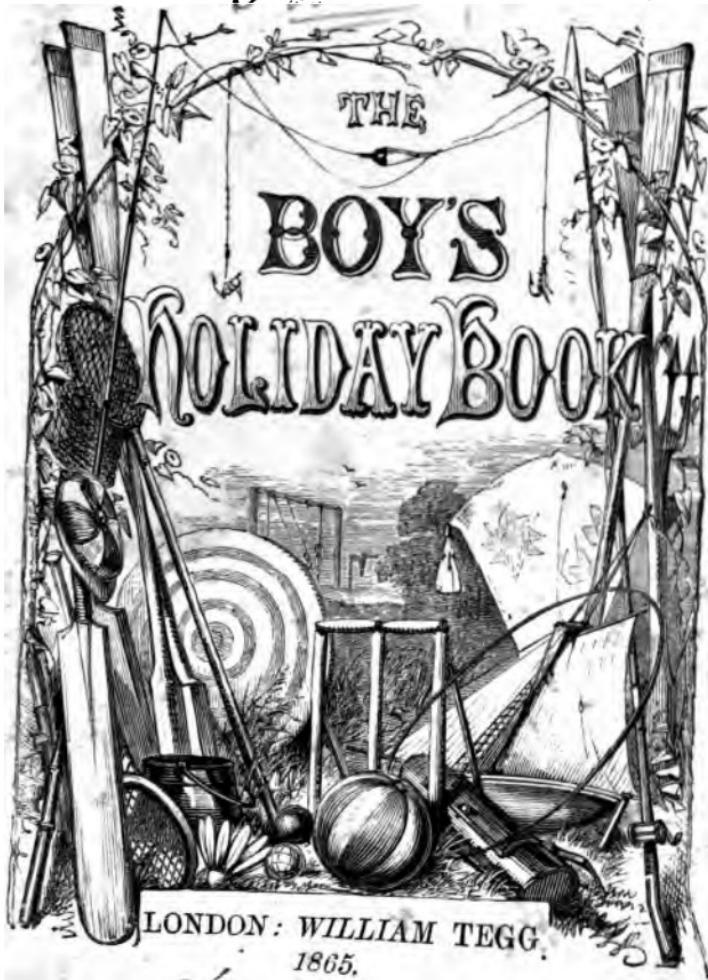






Father's Library

THE
**BOY'S
HOLIDAY BOOK**



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THE BOY'S HOLIDAY BOOK.

HOME FOR THE HOLIDAYS.

ALL the work over for the half-year, books locked up, and the pens, slates, copy-books, and pencil-cases safe in the great school cupboard, there to sleep for six long weeks; six weeks, if only the weather is fine, and the temper good, of real happy sport. Not that it has been so bad through the half-year, for work and play don't go badly together after all, and it is good to think that one is another step up the ladder, though sometimes the sums have been weary and the exercises awfully long.

But it's very jolly to feel we are quite free for a bit, and have nothing to do but to think what to play at and how we can best enjoy ourselves. Here are the boxes tumbling down stairs, and away we go, by omnibus and train, for the dear old home. *Won't we hurrah* at all the stations, and *ask the clerks and porters* remember that they were boys

too once, though now they have to clip tickets and carry boxes all day long? Why shouldn't we halloo? There's mother and father waiting to welcome us, and planning for our games and sports almost as eagerly as we are; and Mary and Jane coming from school to-morrow, and bringing a little visitor into the bargain.

And now, my dear boys, that you are safely at home, I would fain put my little holiday-book into your hands; it may not give you a love for play; that must come from your own boyish nature; but it will tell you what sports and games are ready to your hand when you are asking the oft-repeated question, "What can we play at?" I have tried to tell you what you can do when the long summer days and evenings tempt you into the fields or, with rod and line, beside the river; or in the winter evenings, when the firelight is blazing and school-friends have come to share your amusements. I have not forgotten spare times in holidays during the half-year when the games of the play-ground are more suitable; or little mechanical occupations to bring into play skill that may be of use in after days.

And now, if I may venture on a word of advice, it will be that you practise all those manly sports which will bring health and vigour to mind and body. Don't be always skulking about in corners, too lazy and indifferent even for play; but away into the field for cricket and football. Remember, too, that play may be to a boy a pure and holy *thing*, and that sin and sport have no connexion with each other. *A good game with a quiet conscience is one of the*

purest enjoyments. If boys would but leave off thinking that it is manly to utter bad words, and bully and cheat, they would enjoy their games much more than they do. Above all, don't be too selfish in your sport. If you play truly as a gentleman, it will teach you both obedience and kindness, but a boy always looking out for his own pleasure, and never thinking of any one else's, will soon be a burden to himself and a plague to others. Play, as well as work, earnestly ; be second to none in the game if you can help it, and do not spoil it by inattention and foolishness ; remembering all the while that Englishmen, who have braved danger and won battles, have learned most of their courage and endurance, and even the love of truth and honour, in the play-grounds and fields of Old England.



PAR
OUT-DOOR R

CHAP'

FIELD

CRIC

CRICKET is the best of all the games for the limbs and mien of the player. It requires a well-played cricketer, and scouts him, moreover, his skill : it has, moreover, his it presents a fine eleven, in a game of the captain, who the men in the field to the requirements of eager, and all of cricket. Boys that are listless at the first training, earn earnestness and atten-

PART I.

OUT-DOOR RECREATIONS.

CHAPTER I.

FIELD GAMES.

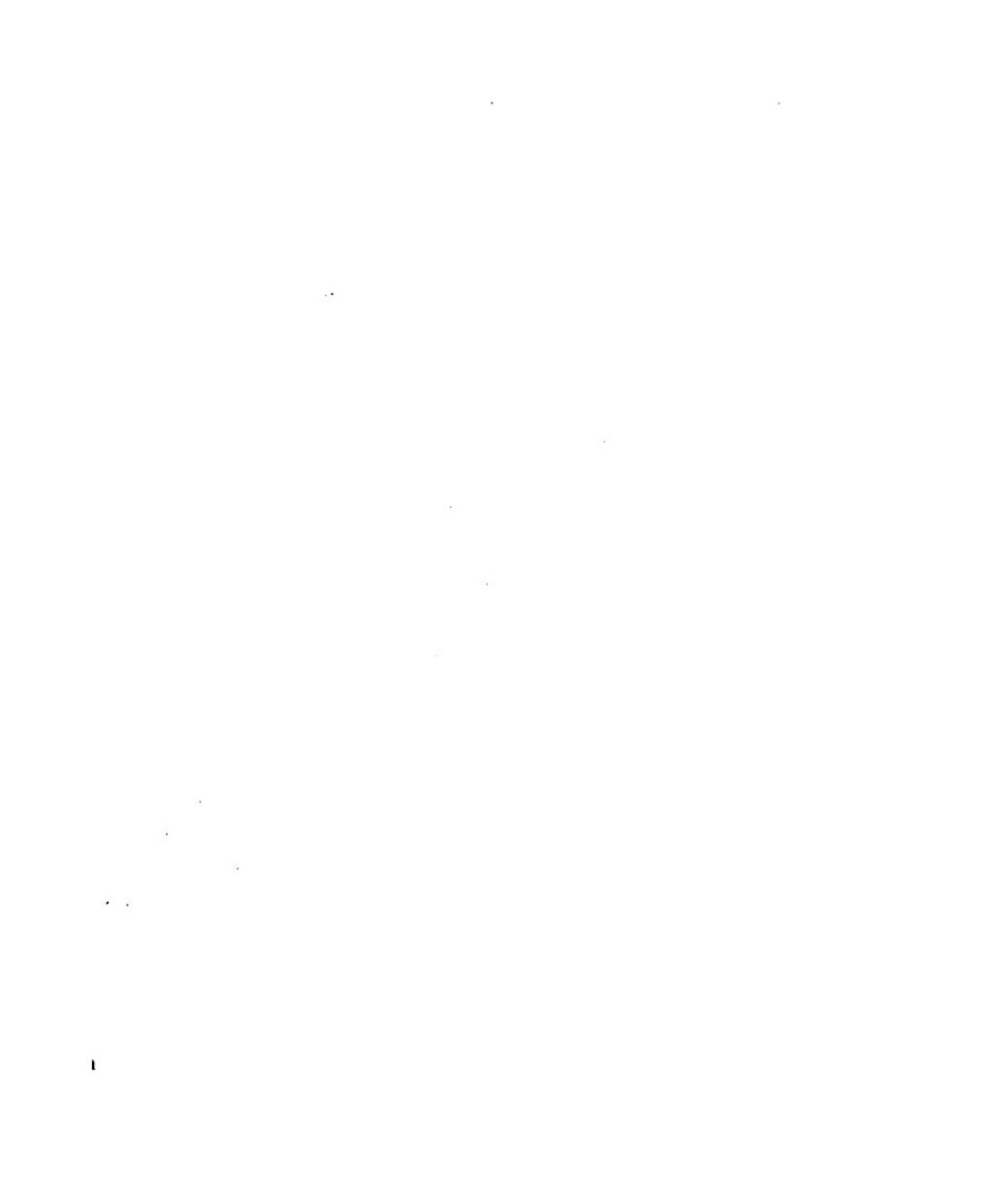
CRICKET.

CRICKET is the best of all the games. It furnishes a fine exercise for the limbs and muscles, as well as for the skill and quickness of the player. There are few more pleasant sights than a well-played cricket-match, where the skill of bowler, batsman, and scouts are tested to the utmost.

Cricket has, moreover, higher qualities than its display of skill : it presents a fine example of the *discipline* of play. All the eleven, in a game of double wicket, are under the direction of the captain, who changes the bowler and the places of the men in the field, or sends in the batsmen, according to the requirements of the game. All must be intent and eager, and *all obedient to command*, or there will be no cricket. Boys that are perpetually shouting and laughing, and listless at their cricket, are sure to be beaten by the first well-trained eleven they encounter. All play *wants earnestness* and attention ; but cricket most of all.

CRICKET.

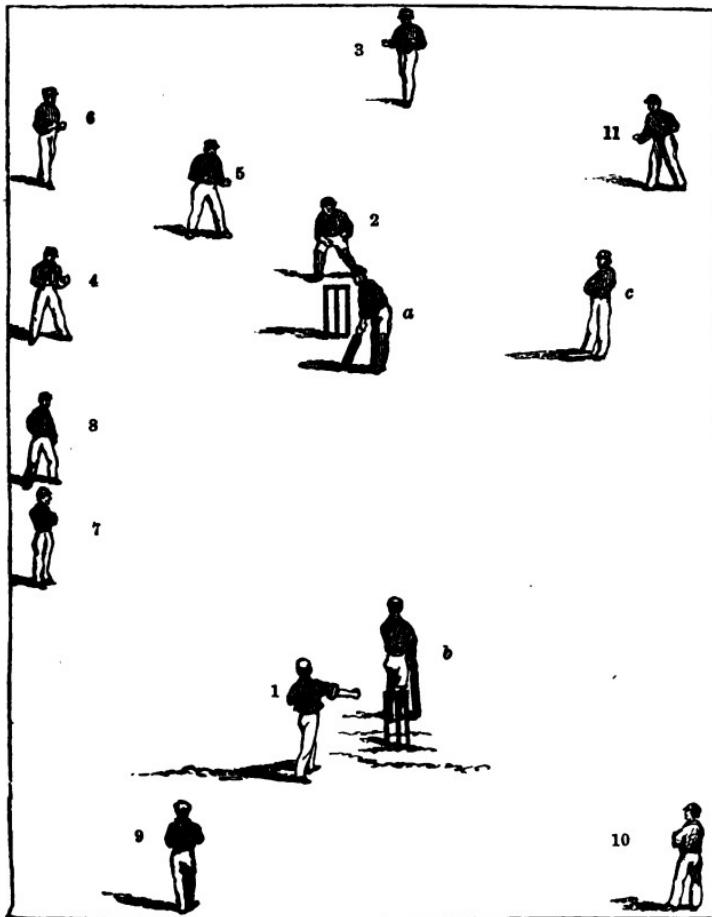




In addition to this, there is a kindly fellowship of feeling between all classes promoted by a game of cricket, which must tell in bringing us all nearer together. Boys find out how to be gentlemanly and kind to all their play companions: what a pity so many should lose it in after days!

Cricket is always played on a green or meadow, the more level and spacious the better. There are two games—*Single* and *Double Wicket*. The latter is the game more generally played. *Single Wicket* is usually played with from four to six persons on either side; *Double Wicket* with eleven; but in both the number may be varied according to the number of players in the field. As either game can only be acquired by practice, as rules vary in different localities, and as a competent knowledge of the respective rules is sure to be attained during the requisite practice, we shall not go into them in detail; but, after explaining the terms used by players, and giving a few general directions, close this chapter with the code of laws last adopted at Lord's celebrated cricket-ground, at Marylebone; and which we recommend our readers to act upon, as far as circumstances may permit. With respect to

BATS, BALLS, AND WICKETS, the sizes and weights prescribed at Lord's are to be understood as adapted for men, and boys must of course be allowed to use lighter ones, bearing in mind that the relative proportions should be strictly maintained, *not only with regard to the bats and balls, but also to the distances between the stumps and wickets, &c.*



*Bowler, 1; Wicket-Keeper, 2; Long-Stop, 3; Point, 4; Slip, 5; Long-Slip, 6;
Mid-Wicket, 7; Cover-Point, 8; Long Field off, 9; Long Field-on, 10; Leg, 11;
Batsman, a; Batsman, b; Umpire, c.*

THE STRIKER, OR BATSMAN.—His duty is obvious from his title. His desire is to strike the ball as far a-field as possible, so as to score runs. He must hold his bat well before the wicket, slightly inclined forward, with the right hand on the bottom of the handle. If the batsman do not keep his bat upright before the wicket, but incline it towards him, his stumps will soon be down.



No. 1.

Illustration No. 1 shows the proper position while waiting for the ball. My young friends will notice that, while the cricketer is in good form, he is without *affection of style*.

The next (No. 2) is the mode in which you may most simply meet a bail ball: take care to keep the bat upright, with the handle *very slightly*, if at all, inclined forward. This is called the “draw.”

In No. 3 the player has advanced his right leg to meet a ball on the off-side.

In No. 4 the left is advanced for the same purpose; but in this case the ball is wider off.

No. 5 is a leg hit.

No. 6 represents the drive.

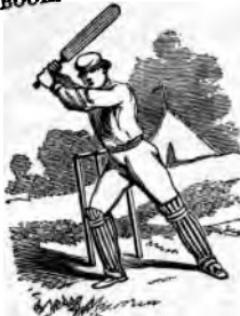
No. 7 is the bowler.

THE BOWLER.—The mode of bowling generally adopted is to hold the ball with the seam across, so that the tips of the

THE BOY'S HOLIDAY BOOK.



No. 2.



No. 3.



No. 4.



No. 5.



fingers may touch it : it should be just sufficiently grasped to keep it steady. There are two kinds of bowling, called round and underhand. It is of no use to describe round-hand bowling ; the learner must find out some experienced cricketer to teach him. The underhand bowler must aim to present his ball with a pitch into the batsman's block hole ; if he can deliver it with a twist, so much the better. This is accomplished by placing the ball on the second finger, and twisting it sharply as it leaves the hand. It must be delivered a little on one side of the wicket, so that when it touches the ground it will suddenly turn inwards to the stumps. Another method of twisting the ball is not to make it actually rotate, but to extend the arm a little outward, and then half turn the wrist in its delivery. The ball should be delivered with one foot behind the bowling-crease and within the return-crease. The bowler must throw the ball in such a way that the striker can play at it, for if it should go over his head or out of bounds, the party *in* will be entitled to one notch, to be put down to the byes. The bowler is not allowed to deliver the ball with the arm *extended straight* from the body, or with the back part of the hand uppermost.

THE WICKET-KEEPER'S business is to watch the striker, and if he moves from the ground, to knock down his wicket



No. 7.

which is called Stumping Out, and to receive the ball from the scouts after it has been hit by the batsman.

THE LONG-STOP is stationed behind the wicket-keeper to save a run, if the ball should pass him as well as the batsman. The long-stop should return the ball *instanter* to the wicket-keeper. The long-stop is frequently obliged to cover many slips from the bat, both to the leg and off-side.

THE SHORT-SLIP, besides fielding the ball, should be on the alert to run in and have the ball thrown up to him, and stump out the batsman. He stands behind the wicket-keeper on the off-side, if the wicket-keeper has to desert his post.

THE LONG-SLIP stands about the same distance from the wicket as the long-stop, in a line with the striker, so as to cover the short-slip. Another player may be placed on the off-side, so as to be ready to receive the ball in case of its being missed by the middle-wicketman.

THE POINT stands from 5 to 7 yards from the wicket. He must be a quick field and a sharp catcher.

LEG stands on the "on" side of the batsman. His duty is principally to watch "leg" hits; that is, when the ball is struck sideways by the batsman, in a line with the popping-crease. Leg also throws up balls sent in to him by outlying fielders.

LONG-OFF AND LONG-ON.—These places want good throwers; that is, low and quick. Long-off is situated according to the batting, but in the majority of cases as shown in the diagram of the field.

MID-WICKET.—This post must be filled by a person who is quick and steady. It is one of the most lively positions in the whole field. Mid-wicket stands on the right of the batsman. His chief office is to catch, for the batsman very frequently sends catches just on the spot where he is posted.

COVER stands not far from mid-wicket, on the “on” side. He has very similar duties to those which fall to the share of the mid-wicket.

THE LAWS OF CRICKET.

THE following are the laws which govern the game. They have been lately revised by the Marylebone Club, which is considered the highest authority :—

1. The ball must weigh not less than five ounces and a half, nor more than five ounces and three-quarters. It must measure not less than nine inches, nor more than nine and a quarter inches in circumference. At the beginning of each innings, either party may call for a new ball.
2. The bat must not exceed four and a quarter inches in the widest part; it must not be more than 38 inches in length.
3. The stumps must be three in number; 27 inches out of the ground; the bails eight inches in length; the stumps of equal and of *sufficient thickness* to prevent the ball from *passing through*.

4. The bowling-crease must be in a line with the stumps; 6 feet 8 inches in length; the stumps in the centre; with a return-crease at each end towards the bowler, at right angles.

5. The popping-crease must be 4 feet from the wicket, and parallel to it, unlimited in length, but not shorter than the bowling-crease; unlimited in length, so that the batsman may keep out of the way of the ball when it is thrown in.

6. The wickets must be pitched opposite to each other by the umpires, at the distance of 22 yards.

7. It shall not be lawful for either party during a match, without the consent of the other, to alter the ground by rolling, watering, covering, mowing, or beating, except at the commencement of each innings, when the ground shall be swept and rolled, unless the side next going in object to it. This rule is not meant to prevent the striker from beating the ground with his bat near to the spot where he stands during the innings, nor to prevent the bowler from filling up holes with sawdust, &c., when the ground is wet.

8. After rain the wickets may be changed with the consent of both parties.

9. The bowler shall deliver the ball with one foot on the ground behind the bowling-crease, and within the return-crease, and shall bowl four balls before he change wickets, which he shall be permitted to do only once in the same *innings*.

10. *The ball must be bowled; if thrown or jerked, or*

if the bowler in the actual delivery of the ball, or in the action immediately preceding the delivery, shall raise his hand or arm above the shoulder, the umpire shall call "no ball."

11. He may require the striker at the wicket from which he is bowling to stand on that side of it which he may direct.

12. If the bowler shall toss the ball over the striker's head, or bowl it so wide that in the opinion of the umpire it shall not be fairly within the reach of the batsman, he shall adjudge one run to the party receiving the innings, without an appeal, which shall be put down to the score of wide-balls; such balls shall not be reckoned as one of the four or six balls; but if the batsman shall by any means bring himself within reach of the ball, the run shall not be scored.

13. If the bowler deliver a "no-ball" or a "wide-ball," the striker shall be allowed as many runs as he can get, and he shall not be put out, except by running out. In the event of no run being obtained by any other means, then one run shall be added to the score of "no-balls" or "wide-balls," as the case may be. All runs obtained for "wide-balls" to be scored to "wide-balls." If the ball shall first touch any part of the striker's dress or person (except his hands), the umpire shall call "leg-bye." If, however, the batsman runs two byes from a wide or a no-ball, they are scored as two wides only.

14. *At the beginning of each innings the umpire shall*

call "play;" from that time to the end of each innings no trial ball shall be allowed to any bowler.

15. The striker is out if either of the bails be struck off, or if a stump be bowled out of the ground;

16. Or, if the ball, from the stroke of the bat, or hand, but not the wrist, be held before it touch the ground, although it be hugged to the body of the catcher;

17. Or, if in striking, or at any other time while the ball shall be in play, both his feet shall be over the popping-crease, and his wicket put down, except his bat be grounded within it;

18. Or, if in striking at the ball, he hit down his wicket;

19. Or, if under pretence of running, or otherwise, either of the strikers prevent a ball from being caught, the striker of the ball is out;

20. Or, if the ball be struck, and he wilfully strike it again;

21. Or, if in running, the wicket be struck down by a throw, or by the hand or arm (with ball in hand), before his bat (in hand) or some part of his person be grounded over the popping-crease. But if both the bails be off, a stump must be struck out of the ground;

22. Or, if any part of the striker's dress knock down the wicket;

23. Or, if the striker touch or take up the ball while in *play*; *unless at the request of the opposite party*;

24. Or, if with any part of his person he stop the ball,

which in the opinion of the umpire at the bowler's wicket shall have been pitched in a straight line from it to the striker's wicket, and would have hit it.

25. If the players have crossed each other, he that runs for the wicket which is put down is out.

26. A ball being caught, no runs shall be reckoned.

27. A striker being run out, that run which he and his partner were attempting shall not be reckoned.

28. If a lost ball be called, the striker shall be allowed six runs ; but if more than six shall have been run before "lost ball" shall have been called, then the striker shall have all which have been run.

29. After the ball shall have been finally settled in the wicket-keeper's or bowler's hand, it shall be considered dead ; but when the bowler is about to deliver the ball, if the striker at his wicket go outside the popping-crease before such actual delivery, the said bowler may put him out, unless (with reference to the 21st law) his bat in hand, or some part of his person, be within the popping-crease.

30. The striker shall not retire from his wicket and return to it, to complete his innings after another has been in, without the consent of the opposite party.

31. No substitute shall in any case be allowed to stand out, or run between wickets for another person, without the consent of the opposite party ; and in case any person shall be allowed to run for another, the striker shall be out, if either he or his *substitute be off the ground in manner mentioned in laws 17 and 21, while the ball is in play.*

32. In all cases where a substitute shall be allowed, the consent of the opposite party shall also be obtained as to the person to act as substitute, and the place in the field which he shall take.

33. If any fieldsman stop the ball with his bat, the ball shall be considered dead, and the opposite party shall add five runs to their score; if any be run, they shall have five in all.

34. The ball having been hit, the striker may guard his wicket with his bat, or with any part of his body except his hands, that the 23rd law may not be infringed.

35. The wicket-keeper shall not take the ball for the purpose of stumping until it has passed the wicket; he shall not move until the ball be out of the bowler's hand; he shall not by any noise incommod the striker; and if any part of his person be over or before the wicket, although the ball hit it, the striker shall not be out.

36. The umpires are the sole judges of fair and unfair play; and all disputes shall be decided by them, each at his own wicket; but in case of a catch, which the umpire at the wicket bowled from cannot see sufficiently to decide upon, he may apply to the other umpire, whose opinion shall be conclusive.

37. The umpires in all matches shall pitch fair wickets; and the parties shall toss-up for choice of innings. The umpires shall change wickets after each party has had one *innings*.

38. *They shall allow two minutes for each striker to*

come in and ten minutes between each innings. When the umpire shall call "play," the party refusing to play shall lose the match.

39. They are not to order a striker out unless appealed to by the adversaries.

40. But if one of the bowler's feet be not on the ground behind the bowling-crease, and within the return-crease, when he shall deliver the ball, the umpire at his wicket, unasked, must call "no ball."

41. If either of the strikers run a short run, the umpire must call "one short."

42. No umpire shall be allowed to bet.

43. No umpire is to be changed during a match, without the consent of both parties, except in case of violation of the 42nd law; then either party may dismiss the transgressor.

44. After the delivery of four or six balls, the umpire must call "over," but not until the ball shall be finally settled in the wicket-keeper's or bowler's hand; the ball shall then be considered dead; nevertheless, if an idea be entertained that either of the strikers is out, a question may be put previously to, but not after, the delivery of the next ball.

45. The umpire must take especial care to call "on ball" instantly upon delivery; "wide ball" as soon as it shall pass the striker.

46. The players who go in second shall follow their innings, *if they have obtained eighty runs less than their*

antagonists, except in all matches limited to only one day's play, when the number shall be limited to sixty instead of eighty. .

47. When one of the strikers shall have been put out, the use of the bat shall not be allowed to any person, until the next striker shall come in.

THE LAWS OF SINGLE WICKET.

1. When there shall be less than five players on a side, "bounds" shall be placed, twenty-two yards each, in a line from the off and leg stump.

2. The ball must be hit before the bounds, to entitle the striker to a run, which run cannot be obtained unless he touch the bowling-stump or crease in a line with his bat or some part of his person, or go beyond them, returning to the popping-crease as at double wicket, according to the 21st law.

3. When the striker shall hit the ball, one of his feet must be on the ground and behind the popping-crease, otherwise the umpire shall call "no hit."

4. When there shall be less than five players on a side, neither byes nor overthrows shall be allowed, nor shall the striker be caught out behind wicket, nor stumped out.

5. The fieldsman must return the ball so that it shall cross the play between the wicket and the bowling-stump, or between the bowling-stump and the bounds; the striker *may run till the ball be so returned.*

6. After the striker shall have made one run, if he start again he must touch the bowling-stump, and turn before the ball shall cross the play, to entitle him to another.
7. The striker shall be entitled to three runs for "lost ball," and the same number for ball stopped with bat, with reference to the 28th and 33rd laws of double wicket.
8. When there shall be more than four players on a side, there shall be no bounds; all hits, byes, and overthrows, shall then be allowed.
9. The bowler is subject to the same laws as at double wicket.
10. Not more than one minute shall be allowed between each ball.



FOOTBALL.

FREQUENT rains and contracting days warn the cricketer that, as autumn is passing away, his play for the year must pass with it. *The last game has already been played at*

Lord's, a few matches only remain in some suburban grounds, and the cricketing season will be over. Boys have already turned their thoughts to football, and the captain of the cricketers is now second in importance to the leader at football.

Perhaps there is no game requiring greater care than this. Little boys ought not to play with big ones. Mr. Maclaren, of Cambridge, has published in "Macmillan's Magazine" an earnest protest against this, and speaks of it as a constant source of injury for life by rupture and other casualties. The Football Association have taken great pains to draw up a code of rules which shall free the game from any objectionable features, and we cannot do better than publish their rules as a guide for the game.

Since these rules have been issued, many schools have been allowed the game, where before it was strictly prohibited.

It is a noble game, and it is a great pity that for want of a little care any evil should arise from it. We would call special attention to Rules 10 and 12.

RULES FOR FOOTBALL.

1. The maximum *length of the ground* shall be 200 yards, the maximum *breadth* shall be 100 yards, the length and breadth shall be marked off with flags ; and the *goals* shall be defined by two upright posts, 8 yards apart, without *any tape or bar* across them.

2. The winner of the toss shall have the choice of goals, *the game shall be commenced* by a *place kick* from the centre of the ground by the side losing the toss; the other side shall not approach within 10 yards of the ball until it is kicked off.

3. After a goal is won, the losing side shall kick off, and goals shall be changed.

4. A goal shall be won when the ball passes between the goal-posts or over the space between the goal-posts (at whatever height), not being thrown, knocked on, or carried.

5. When the ball is in *touch*, the first player who touches it shall throw it from the point on the boundary-line where it left the ground, in a direction at right angles with the boundary-line, and it shall not be in play until it has touched the ground.

6. When a player has kicked the ball, any one of the same side who is nearer to the opponent's goal line is *out of play*, and may not touch the ball himself, nor in any way whatsoever prevent any other player from doing so until the ball has been played; but no player is out of play when the ball is kicked off from behind the goal line.

7. In case the ball goes behind the goal line, if a player on the side to whom the goal belongs first touches the ball, one of his side shall be entitled to a free kick from the goal line at *the point opposite the place where the ball shall be touched*. If a player of the opposite side first

touches the ball, one of his side shall be entitled to a free kick at the goal only, from a point 15 yards from the goal line, opposite the place where the ball is touched ; the opposing side shall stand behind the goal line until he has had his kick.

8. If a player makes a *fair catch*, he shall be entitled to a *free kick*, providing he claims it by making a mark with his heel at once ; and in order to take such kick he may go as far back as he pleases, and no player on the opposite side shall advance beyond his mark until he has kicked.

9. No player shall carry the ball.

10. Neither tripping nor hacking shall be allowed, and no player shall use his hands to hold or push his adversary.

11. A player shall not throw the ball or pass it to another with his hands.

12. No player shall take the ball from the ground with his hands under any pretence whatever while it is in play.

13. No player shall be allowed to wear projecting nails, iron plates, or gutta-percha, on the soles or heels of his boots.





HOCKEY.

PROVIDE yourself with a good oak stick slightly turned at the end. Choose sides and make goal as at football. A cork bung is the best thing to use as the ball. Toss up for first strike. Let the striker then place the cork a third of the way between the goals, the opponents standing a few yards in front of him. This game is a very fine one when well played. *The new football rules are capital for it*, with this addition, which has always been a law in the game, and a most important one—that no striker must hit the cork when on his wrong side, or in any way touch it, i.e., his left hand must always be toward the goal for which he is making. When this is properly attended to, it prevents almost all danger of striking the shins. In Ireland, the game is played with a large ball covered with leather, but not hard like a cricket-ball, and with large bats mostly made of ash in a curved shape: it is called “*hurley*,” and is, if anything, the better game of the two.



HARE AND HOUNDS.

Who that has read "Tom Brown's School-days" is not all agog at the name? Not that they will wish to emulate poor Tom and Harry in their great weariness, but the pluck of the run and the excitement of the chase, the kindly glow of the "Doctor's" study, and the hot buttered toast, shed such a bright light over the whole game that no true boy, who has ever read it, can help wishing that he had been one of the party.

For London boys there is no place like the outskirts of Epping Forest, and for all boys it is best to choose a place for the game where there will be no hindrance to a good run across country.

The first things to be got are two strong bags to hold the scent; each should be as large as the boy can carry while *he is running*. Next tear up into small pieces newspapers,

old copy-books, and any waste paper you can procure, and fill the bags with them. Having fixed a place for the meet, two should be chosen for hares, strong boys who are good runners. Some spot should be selected about a mile or two off, round which the hares must go, dropping scent behind them at intervals all the way, not very thick where the way is quite clear. Where the course is not clearly marked, care must be taken that there shall be no doubt as to the hounds finding the scent, at any rate, with a little casting about. When the hares have had about five minutes' start, the hounds should follow in parties; those who are first to strike the scent calling out “Forward,” that the rest may follow. The hares must try to get round the place agreed upon and back to the point of departure without being overtaken, while the hounds, on their part, must do their best to come up with them. In returning, the hares sometimes follow a little way on the old scent: this is allowable, provided the point of entering and of departure be clearly indicated.

“I SPY.”

THIS is another good game of speed and skill. Sides being chosen, one party goes out and hides. Warning is given when all are ready, and then the seeking side endeavour to find the others. When one is seen by any of the seekers he calls out, “I spy so and so,” calling him by name; *all then try to run home* before the player who has

been spied can touch them : he can only touch one, and whoever is touched remains out of the game till all are found. It is allowable for any of the party hiding to spring out and touch one of the other side if he can, without first being spied. If half the side are touched, the side have their hide again. This game is played with many variations ; from long experience with boys, I have, however, known this plan to afford by far the most sport. A great deal depends upon the spirit with which the seeking is carried on. If the hiding-places are not very good, it is sometimes well to let the out side touch more than one each.



ROUNDERS.

ROUNDERS is one of the very best games for a party of boys, as they are divided into two equal sides and the interest is constantly maintained. A ring is made for the *innings party*, while the outsiders, except the feeder, are

scattered as scouts through the field. Three, four, or five bases (according to the size of the ground and the number of players), are made with stones or sticks at equal distances, leaving one side of the ring in a circular line and coming back at the other. The bat is an ordinary round stick, and the ball a common tennis. The ball is delivered by the feeder, with a gentle pitch, and the player who is taking his turn at the bat hits it as far as he can, and then runs round as many bases as he is able. He is out if he misses the ball when attempting to strike it, or if hit with the ball when running between the bases; and all are out if the ball is thrown into the ring when no one is at home, or if the ball is caught before touching the ground when hit from the bat. The innings party change places with the outsiders when all are out.

When all the players on the in side except two or three have been put out, an attempt is generally made by the best of the remaining players to bring all back into the game, and for the in side to begin over again their innings.

This is done by notice being first given that the *Rounder* is going to be tried, and the striker then endeavouring to hit the ball far enough to get round all the bases and back home before the ball is grounded in the ring. If this is done, he claims all his side in again. Notice, first, the "*Rounder*" cannot be defeated by hitting him with the ball while running; he *can only* be put out by catching the ball *or grounding it in the ring*—second, the *Rounder* may *have two strikes at the ball*.

FEEDER.

THIS game is a modification of Rounders. It is more suitable when there are few players, as there are no sides, all playing against one another. There is a *feeder*, who throws in or *feeds* the ball as in Rounders. Each takes his strike in his turn. If the striker hits the ball he runs as many bases as he can. A player is out if he is hit whilst running, if he misses his strike, or if the ball is caught. The object of the game is to prevent yourself being feeder. An assistant to the feeder is stationed behind the striker, to catch the ball off his bat if possible. A player when out takes the assistant's place, the assistant taking the feeder's.



QUOITS.

THERE are few athletic games more interesting or more *conducive to a healthful play of the muscles than quoits*. It appears also to have been one of the most ancient. No

visitor to the "Gallery of Antiquities" in the British Museum could fail to have seen and admired the figure representing the throwing of the disc, with body bending intensely forward, the right arm extended just as the disc is leaving it, the muscles wonderfully and truthfully developed, as among the grandest specimens of Grecian sculpture left us. Copies of this renowned sculpture adorn many provincial museums.

The quoit differs in shape from the flat plate-like form of the ancient disc, and probably the conditions of the game differ still more. As an athletic exercise it must be substantially the same. The modern quoit resembles a section of a sphere, with a large opening in the centre, thus leaving a raised circular bar varying from 6 to 8 inches in diameter, the rim being about 2 inches in breadth.

The game is played thus:—Two players should be on each side; one from each side taking his stand at each end. Two iron pins are driven into the ground at a distance of 18 or 20 yards. The rivals then throw the quoits alternately, four in number, from one pin to the other, and the *nearest* quoit to the pin reckons one to the game; if the same player has both his quoits in nearest, it counts two. If the quoit is thrown so as to "ring" the pin, three or four is reckoned towards the game, which is sometimes eleven and sometimes twenty-one. The players at the other end then take their turn, and so on.



ANCIENT ARCHERS.

ARCHERY.

BEFORE, and indeed long after the invention of gunpowder, England's archers were the terror of the world. The soldiers that could stand before our yeomen's hail of cloth-yard shafts were rarely produced. The archers would rise from behind a hedge and, first pouring in a storm of arrows, would throw down their bows, and charging the foe with a true English cheer, backed by their short brown swords, would generally succeed in putting the enemy to flight. Some of the feats of strength and skill which are on record are indeed almost incredible. Thus we are told that Callum Dhu, a Scotch chieftain, "Ne'er sent shaft that came out where it went in;" meaning, of course, that when he shot at a man his arrow went through and through him. But we must proceed to the subject of modern archery.

Unless our young archer lives at a great distance from any town, it will be best for him to buy, and not to attempt to make his tools. Let him go to a real archery warehouse, *and above all, let him avoid toy-shop gimcracks.* Of these *we ourselves have had painful experience.* If he should

see a bow of a good red colour, with fine white fibres running the *whole* length of it, he may buy that bow on our own special recommendation. It will be useful for him to provide himself with a brace. **This** is a well-polished piece of leather made to fasten on the left arm, to receive the string whilst shooting, in order to prevent the arm being injured. After a little practice, however, this will become unnecessary.

THE Bow.—Let the beginner select a bow of about 20 lbs. draw, *i.e.*, if the bow were suspended across a beam, a weight of 20 lbs. would be needed to bend it to the length of the arrow.

THE ARROW.—For general use an arrow should be selected in length proportioned to the bow, of medium weight, with a steel head not too heavy. This arrow should have three feathers placed so as for two to be opposite one another, and the other, which is red and called the cock feather, fixed on between the other two. The part of the arrow next the string is called the nock.

THE STRING.—The part of the string which receives the nock of the arrow is whipped with sewing silk to prevent the string being rubbed and weakened. If the string should suddenly break, the bow is liable to snap also, so be careful to keep it in good condition. If your bow be five feet long, the string should be rather more than five inches from the bow handle when the bow is strung.

STRINGING THE Bow.—*Place the bottom end of the bow in the hollow of the left foot, advance the right foot about*

eight inches to the front, and grasping the handle of the bow with the left hand, and applying a peculiar half-pressing, half-pushing force, slip the loop into its place.

NOCKING THE ARROW.—Pass the steel point beneath the string and over the upper side of the bow handle, now held in a horizontal position across the body, towards which the string is turned; confine the arrow-head there, with the forefinger of the left hand, whilst shifting your shaft hand down to the nock. Turn that round with the thumb and two first fingers until the cock feather is perpendicular; the other two being flat or parallel with the bowstring, upon which you now place the arrow-nock exactly at the spot indicated by the silk whipping.

ATTITUDE.—To take aim, the left foot should be advanced



and the weight thrown on the right foot. Raise the bow to the full stretch of the left arm, keeping the bow now perfectly upright. Keep the eyes fixed on the golden centre of the target, not allowing them to rest for an instant on the shaft. Drawing and loosing are to be performed *in one continuous action*. Grasp your bow with the firmness of a vice, draw

steadily until the steel head of your arrow rests upon the knuckle of the bow hand, while the thumb of the drawing

hand grazes against the upper part of the right ear. Then when everything except the golden centre of the target seems indistinct, let fly, and you have a good chance of seeing your arrow reach its mark.

In conclusion : Be very careful not to handle the feathers of the arrow. If you once get these ruffled, nothing can smooth them again, and unless these be smooth, the arrows will not fly straight. Increase the strength of the bow and the distance of the target in proportion to your own strength. Never shoot in public with a bow too strong for you ; it is sure to make you look ridiculous. Above all, remember that archery is not to be trifled with, and that although with care there is no danger, yet accidents may happen even with such apparently insignificant weapons as a bow and arrow.

There is a good archery club at the Crystal Palace, Sydenham, but we should recommend private practice at the grounds, with careful attention to our suggestions, before joining a club.





THE KITE.

FLYING the kite is a pleasant amusement for the fine weather, when very active exercise is not desired, and a warm, not too strong wind is blowing.

As kites are sold at all toy-shops, those who have money at command will probably be content to purchase; but as some may wish to have them of larger dimensions than those usually prepared for sale, or may have a laudable desire to exercise their ingenuity in construction, we give the following instructions for making a kite:—Procure a straight lath or piece of light wood for the stick or upright, and a thin hoop or pliant piece of wood or cane, of proportionate dimensions, for the bow. Notch the ends and the centre of the bow, thus forming a groove for a string, and then tie them in a semicircle, *passing the string once round the upright stick, so as to secure it from running.* Next fix a string from the end

the binder on either side to within an inch of the bottom of the upright, making a notch on each side to prevent it from slipping. The skeleton being thus completed, cover the whole with thin paper of a close hard texture, the outer edges of which must be turned over the external string and bow, and fastened down with paste. A loop to fasten the string to must now be formed by making two holes with a gimlet in the upright, one about a fifth of its length from the top, the other at a rather greater distance from the bottom, through which a string is to be run, and then knotted. The bow may be decorated with a bunch of paper cuttings at each extremity. The tail should be about five times the length of the kite, and at intervals of every three or four inches must have bobs of writing paper, about three or four inches long and three or four times doubled, to give them weight and consistence. If the kite will not rise, but beats down and dips, either the tail is not of the proper length, or the string is not fastened properly to the loop. It will take some practice, and sometimes a good deal of running, to get a kite well up, but it is a very gratifying plaything. The great Franklin did not disdain the use of kites, and drew many important deductions from their action in the air. He was in the habit of setting one up previous to bathing, and then allowing himself to be drawn along the water by the kite string. None but a good swimmer ought to try such an experiment, for if the string were to break, the kite and the boy would take opposite directions.

CHAPTER II.

GAMES FOR THE PLAY-GROUND.



THE PLAY-GROUND.

WHEN boys come out of the school-room, where they have been for some time under restraint, and where the air has begun to get close, they naturally like to give free course to their limbs and lungs. This, however, can seldom be fully done in the play-ground. After the first gush of free life, they will find some sore trials for the temper, and many things in which they must still exercise self-restraint. Where the ground is very large, or where there is a field close by into which they can run, there are fewer obstacles. But it often occurs that some boys want to play one game, and some another. Perhaps "Chevy" is the cry of the majority: if this is so, unless the ground is large, it is not an easy thing for different games to go on at the same time. Yes, even in the play-ground, there is need for one to give *in to the others*, and for the little courtesies and kindnesses *which are so necessary* in all circumstances in life. Here's a

bit of French for you, which is as true of the play-ground world as of any other :—

C'est l'amour, l'amour, l'amour,
Qui fait la monde à la ronde.

I only wish that all play-grounds were as large as some which I have seen, that so there might be less trial to the temper, though I have often witnessed 40 and 50 boys turned out into a small space. Where such is the case you must try to be accommodating to each other ; and get your masters, as often as they can, to take you out to the fields.

The better you play, the better you will work : indeed, I know a school where the master has for some time lengthened the play hours and shortened those for work, and he says that his boys do just as much as they did in the longer time.

CHEVY CHASE.

JUST as cricket takes the lead of field games, so is this the first among games in the play-ground. There is great room for skill as well as speed, and, other things being equal, the side which is the best disciplined is sure of success. Any number may play ; but ten or a dozen on each side will make the best sport. Mark off one end of the play-ground by a well-defined line ; divide this space in the centre by a line running at right angles. Prisons must be marked at the opposite angles of the ground. The captain of *one party* then sends out a player who can dodge

well, who goes to the end of the ground, midway between the prisons, and calls "Chevy :" when this is called, the opposing party sends a player to touch him ; one on the chevy side next runs out to touch the second, and so on, both sides sending out as many of their partners to touch their opponents as they please. Each player strives to touch any one of the opposite side who left his bounds before he did, as he must not touch any one who started after him, although they may, if they can, touch him before he gets back to his own bounds ; but if a player has taken a prisoner, he cannot be touched when he is coming back to his bounds again. It is the rule, that a player may touch only one of his adversaries every time he leaves his base, and every prisoner must be taken to the prison of the party opposed to him, where he remains till one of his own side can manage to touch him. Whoever comes to rescue the captive must have started from his bounds after the other has reached the prison, and the prisoner and his companion are not allowed to touch any one, or to be touched, in returning to their base. The game is won when the whole of one side are prisoners.

FRENCH CHEVY.

THIS is a good variation of the former game. It is played as follows :—The bases are marked off at *opposite corners*, and the prisons at the corresponding corners. The chevy side *then sends a player* sufficiently near to form a lure to the

opposite side, who calls "Chevy." If the following up is well managed, there is often some very pretty play, especially in releasing the prisoners.

WARNING.

ANY number may play this game. One is placed within a boundary, and all the others are ranged opposite to him. The one is to endeavour to touch some of the party, but before he leaves his bounds for the purpose, he is to give notice in these words :—"Warning once, warning twice, warning three times over ; a bushel of wheat, a bushel of rye,—when the cock crows, out jump I !—Cock-a-doodle-doo ! Warning !" He then begins his chase, and touches the first he can overtake, who must return with him to his bounds. These two now join hands, and first crying "Warning !" rush out together, each endeavouring to touch one of his playmates, who must also return to the bounds, and at the next sally join hands with them ; and so the game is continued, till every player is touched and taken. As soon, however, as the touchers comprise more than three, the one that began the game is at liberty to join the out-players. It is not lawful to touch if the besieging line is broken ; and the out-players are at liberty to attack it for that purpose. Directly a player is touched, the line is to separate, and if the out-players can catch any of those be-

longing to it, those caught are compelled to carry their captors to the bounds on their backs.

Some boys have a nasty habit of kicking those who try to break the line: this is destroying the real fun of the game, and should not be allowed. Remember, it is a mean trick when a big boy catches a little one running home, to compel the little one to carry him.



LEAPFROG.

LEAPING is a capital athletic out-door sport, and may be joined in by any number, provided there be sufficient space. Supposing a dozen engaged in the game, eleven of them must take their positions in a row, each about six yards apart. They should stand with their faces all in one direction, the arms folded or resting on the thighs or knees, the head turned down, so that the chin may touch the breast, the back bent, the shoulders rounded in, and the legs so posed as to keep the body firm. The one

not so placed then begins by taking a short run towards the nearest of the eleven, over whom he leaps by placing his hands on his shoulders, and springing from the ground at the same instant. It is the vaulter's province to go clearly over his playmate, with one leg on each side of him, without knocking him down or disturbing his position. In the same way he is to spring over each of his other companions till he has passed the last of them. He then takes his position at the end of the line, for the others to jump over him in like manner. The first over whom he has leaped follows, vaulting over each of the others as he has done ; and thus the game may be continued as far as the space will admit, or till the parties are tired. Sometimes, in playing at leap-frog, the person jumped over is placed sideways, so that the jumper has to stretch his legs apart to the utmost, in order to clear him. If the leaper knock down the boy to be leaped over, or do not clear him with the agreed exactness, he is debarred from further leaping, and must take his place at the end of the line, till his next turn arrives.

KING CÆSAR.

MARK off a base at each end of the ground. Choose one player for King Cæsar. He then must take his stand between the bases, and try to touch those who run across. When three are touched, *he goes back to one of the bases. After this, those running across must not only be touched*

by the three who have been themselves touched, but must be held until one can touch the other's head, and say, "I crown thee King Cæsar;" and this goes on till all are caught. No one must return to the base which he has left unless he is hopping.

TOUCH

Is a game of speed. There is no limit, but about six is a good number to play. One is made Touch, and he is at liberty to chase the whole party, or any one from it that he may select. As soon as he can run one down, so as to touch him, that one becomes Touch till he can transfer the post in like manner. Sometimes touching *iron* or *wood* is held to exempt the player from being made Touch, in which case, Touch can only chase him while he is running from one piece of iron or wood to another.

CROSS TOUCH

Is a game of better sport. Whoever is Touch selects one whose name he calls out, and chases him until one of the players runs between them, upon which he has to chase the person crossing, and so on till one is touched; upon this all the players *stand still* until the new Touch has made his *selection, which must not be the one who has just touched him.*

TIP-CAT.

THIS game is played with a piece of wood pointed at each end. A ring is made on the ground about half a yard across, and a line drawn at a distance from it. One then takes a stick and stands by the ring, and the other pitches the "cat" from the line, trying to get it into the ring. If the cat does not lie in the ring, the player tips it with his stick, and then strikes it while it is revolving in the air. He has three tips and strikes. This done, he gives the out-sider so many jumps (or, as some play, lengths of the stick) : if he can jump it in so many, the player is out ; if not, they are reckoned so many points to the player. Should the "cat," when pitched, fall on or over the line, the player has only *one* tip : the player is out if it fall on the ring, or if the cat is caught in the air.

WOGGLE.

THIS requires four players—two on each side. It is a good game. Make two rings about eight feet apart. Let each take his stand by the rings as the batsmen and bowlers at cricket, with a small flat piece of wood instead of a ball. Each of the "in" players must have a "rounder" stick, and try to hit the wood when pitched to him by his opponent at the opposite ring. If he hits it far enough, let him run as they do at cricket. He must ground his bat in the ring. If the wood fall in the ring, he is out. If the

wood, when pitched, fall within a span of the ring, a "woggle" is called, upon which the two out-siders march off with the piece of wood, and in secret settle which shall bring it back; they then return, each having his arms folded, and each pretending to have got the wood in his hand. Each then leans over his ring, and those inside have to run. They should try to guess which out-sider has the "woggle," and the one nearest him should delay running till the other has nearly reached his ring. Of course, if they mistake as to who has the "woggle," the wood will be quickly deposited in the ring before the other reaches; but if they guess right, the probability is that the run will be safely accomplished, unless the outsiders can throw it quickly enough from one to the other for it to be put into the ring before the player reaches it.

HOPSCOTCH.

THIS game, which in some parts of the country is called Pottle, must be played on a pavement, a floor, or a smooth gravel path. A frame must be drawn with chalk, about ten feet long by four in width. This frame is to be subdivided as follows:—the first section to be formed by drawing a line straight across it, about two feet from the end chalk line. The next section is to be four feet from the *line last drawn*, to be marked out by a line straight across *like the other*, and to be then subdivided into four by draw-

ing a line across the centre, from each of the upper to the lower corners. The remaining four feet are to be divided equally into two parts, by drawing another straight line through the centre, and the beds, or hops, are then to be numbered as they are formed. The figure thus prepared, one of the players is to take a small piece of tile, or any article agreed on, and standing at a mark drawn some five or six feet from the frame, is to pitch the article into the No. 1 division, or bed. He is then to hop into the same division, or step into it, as may be agreed, and striking the coin, or whatever it may be, with his toe, contrive to kick it into No. 2 bed. He is next to strike it with his toe so as to drive it clear out of the hopping-frame, in the direction of the line he entered at. He is then to quit the bed by hopping from No. 2 to No. 1, and then out without touching either of the chalk lines. Returning to the boundary-line, he is to pitch the coin into No. 3 bed, to hop through No. 1 and No. 2 into No. 3, to kick the object into No. 4, and thence, at one touch, to cast it again clear out of the bed, towards the starting-line; and then hop out of the bed through 3, 2, and 1, entering each in his way, without touching either of the chalk lines, allowing his second foot to go to the ground, or touching the ground or any thing else with either of his hands. This is to be repeated with each of the other divisions up to No. 7, and then backwards through 6, 5, 4, 3, 2, 1. This done, he is to cast the tile from the line into No. 1, to kick it into No. 2, 3, 4, 5, 6, 7, *in succession, and thence down the centre of the hopping-*

frame towards the starting-line, bringing himself also home by hopping through each division in succession. If he can go through this long performance correctly, he has won the game in the first innings: if he fails, the opposite party comes in, and commences the game for his side. If he should break down, the party first in, or his companion, takes up the game at the point to which he had carried it; and so it is pursued until one side has accomplished the feat. The rules of the game require that the hopper should never touch a chalk line, and that he make but one hop in passing from one division to another; but he may touch the piece of tile, &c., as often as he thinks fit, in moving it from one bed to another, provided it never rests on the chalk line.



BASTE THE BEAR.

ONE boy is chosen for bear, and takes his place on some *slight elevation*, fit for the purpose. One end of a rope *about three yards long* is placed in his hand, and a boy

chosen as the bear's keeper takes the other end. The other boys are then to attack the bear with twisted handkerchiefs (no knots should be allowed), and the master is to endeavour to touch some one of them. When he succeeds in doing so, without letting go the rope, or pulling the bear from his place, the boy so touched becomes the bear. Whoever was bear last then goes keeper, but if, after trying a short time, he touches nobody, the bear can select a fresh keeper. A boy having been once (or oftener), bear, is not exempt if fairly touched again.

HOOPS.

WE need not describe the hoop, and the art of trundling it must be acquired by practice. Wooden hoops are now almost thrown out of use by the neat and accurately-formed iron ones to be procured at most of the toy-shops. Sometimes boys run races with hoops, the one winning who either keeps his hoop up the longest, or first reaches the prescribed home without letting it down. A good game with hoops is called "keeping turnpikes." The gates consist of two stones placed from six to ten inches apart, less or more. These gates are arranged at intervals round the play-ground, and have a keeper to each. The boys with hoops then endeavour, *without slackening speed*, to guide the hoop *through the stones*. If any one fail, and either

touch one of the stones, or go outside of them, the keeper and he change places. In any case a change should be made after a few rounds.

BATTLEDORE AND SHUTTLECOCK.

BATTLEDORES are either plain thin bats of wood, or are smartly made with a head covered on each side with parchments about an inch apart, so as to yield a drum-like sound when struck. The shuttlecock is a small stock, about an inch in length, set with feathers. If two play, they stand at convenient distances, striking the shuttlecock to and fro between them ; the one that misses the fewest times in striking it being the best player. A single player will find battledore and shuttlecock an amusing exercise.

THE PEA-SHOOTER

Is a tube of tin, from which a pea may be propelled a considerable distance by the mere force of the breath. From this comparatively foolish toy has emanated a game called

BLOWING WITH THE DART,

Which has its uses in practising the eye in aiming at an object. A small target is placed against a wall, and in lieu of peas the players are supplied with small darts, with pins in one end (to stick into the target), and a circle of feathers,

e expanding object, at the other, to insure the entire of the tube by the base of the dart. The one who tenest strike the bull's-eye by propelling this dart is breath becomes the winner of the game.

THE POP-GUN

e of a piece of straight elder-wood, from which the pith en extracted, or it may be purchased at the toy-shops. a stick or rammer, nearly as long as the gun. A piece ted paper or tow is put tightly into one end, and then gently to near the other end of the gun by the ram- stick. A second pellet, like the first, is now placed the other end, and if the rammer is then smartly through the gun, the consequent compression of the ll propel the first pellet to a considerable distance, ith a loud pop or report. The other pellet must then de to supply the place of the first, a fresh one must roduced at the near end of the tube, with which the will be ejected, and thus the pastime may be con- l.

THE RIFLE POP-GUN

onsiderable improvement on the preceding. It con- f a tube about two feet long, fixed to a stock, by look- long which, *tolerable aim* may be taken at a target. *player should have pellets of different colours, so as*

to be able without difficulty to identify them ; and the pellets should be made of soft wax, or some adhesive matter, so that those that strike the target may stick to it.

THE SUCKER

Is a circular piece of stout leather, with a piece of string passed through the centre, and secured on the under side by a knot. If this leather be well soaked in water, and then closely pressed on any object of moderate weight—such, for instance, as a brick, it will adhere so closely to it as to enable the player to lift and carry the article about. The string must fit very tight in the hole.

THE SLING

Was an ancient instrument of warfare, and most of our young readers have read, we presume, in Scripture and elsewhere, of the skill with which the instrument was used in early ages. In the play-ground a plain strap, from three to four feet long, is sufficient for practice. One end must either be fastened to the wrist, or held securely in the hand. The other must be held lightly. In the loop thus formed in the centre of the strap, place the missile, and after whirling it round and round till you consider you have given it sufficient power to reach the object aimed at, let go the end

of the strap you have been instructed to hold the lightest, and the missile will take its departure with great force and velocity.

RINGS.

THIS is played like quoits, but with flat rings, so as not to dig up the gravel when thrown. You can get these rings made at the blacksmith's. It does not do to play this game when many are in the play-ground, but affords capital sport to a few. I have known it played by boys for months together every day.

DUCKSTONE.

THIS game must have at least three players; but the more the merrier. We must, however, caution our readers against playing it roughly or carelessly, as they may do one another much harm, from the force with which they throw. A large stone, having a tolerably smooth and flat top, is placed on the ground, and a line is marked off about eighteen feet from it called *home*. Each player being provided with a stone about the size of half a brick, or rather less, the game is begun by pinking for "duck," *i. e.*, by all standing at the "home" and throwing their stones or "ducks," in succession, at the large one: the player whose duck rolls farthest from the large one becomes "drake," and must place his stone on *the top of it*. The others take up their ducks and go to the home while he is placing his down;

they then throw their ducks, one after the other, at it, and if it is knocked off, "drake" must immediately pick it up and replace it, the throwers endeavouring to run home while he is so engaged. If "drake," after he has replaced his duck, can touch one of the throwers as he is running home with his duck in his hand, the one touched becomes drake. When the duck is knocked off by any player, it must be instantly replaced, as "drake" cannot touch any one when it is off its base. Should all have played without knocking the duck off, there is room for much skilful manœuvring to get home. Above all, try to get home quickly, and rather take the chance of getting touched than stop long hanging about.



GAMES WITH TOPS.

PEG-TOPS with heavy bodies and short pegs spin much more steadily (or *sleep* as the boys call it), than those of less bulk, and on larger pegs. From this hint our young friends will know how to select the top most appropriate to the

pastime they are about to practise. Some merely spin a top to see how long it will stand on the ground, or how often they can take it up in a wooden spoon ; but parties of boys often play a game in this way :—A circle about three feet in diameter is drawn on the ground, and, after deciding who is to begin, one of the players spins his top into it. Another immediately casts his top at it in a spinning state, endeavouring to split the top of the first player with the peg of his own. In like manner, all the players follow, each being at liberty to strike any one of the tops while in the circle ; he who succeeds in splitting it, being entitled to keep the peg as a trophy ; and many pegs do some of the most adroit at this game boast. Directly, however, a top gets beyond the ring, in a spinning state, the owner takes it up with all speed, and returns to the game. If, however, a top drops within the circle, or rolls out of it after it is spent, or if the owner sets it spinning beyond the circle, or after being thrown it fail to spin—it is called “a dead top,” and is placed in the centre of the ring for the others to peg at. If knocked out without being split, the owner takes it up and resumes the game. In winding, the cord should be carried round the greater part of the peg as well as the grooved part of the top. Peg-tops, however, are toys with which mischief may be done, and we therefore much more commend

WHIP-TOP, which is a capital exercise, and free from objection of any kind. The *top* must be procured from a shop, where also *whips of eelskin* are sold. An expert player

may, however, keep up a top with a strap and other substances of a more lasting quality than eelskin. A little practice will teach him how to put the top in action with the hands, which is then to be continued by the whip. One can play at whip-top : where more than one have the use only of one top, the innings of each lasts as long as he can keep the top up. Where each player has a top, races may be made up by trying which can soonest whip his top from one specified bound to another ; or "encounters" may be played, one trying to knock down the top of the other by whipping his top against it.

CHIP-STONE.

CHIP-STONE is played by two or three boys, who each select a small roundish stone. Bright black stones, having a very even shape, and a polished surface, are more esteemed than any other. Two lines should be marked on the ground, at some distance apart, and the pebbles should be placed on one of them. The peg-tops are then spun, and whilst they continue spinning, the players must take them up in wooden spoons (which can be purchased at the toy-shops), or in their hands, and "chip" or cast them at the stones, the design being to drive the latter from one of the lines to the other. The players are allowed to take their tops up in their spoons, and "chip" as often as they can. A skilful player can "chip" three or four times before the top ceases

spinning. The player who can send his chip-stone from one boundary to the other, in the fewest spins, is the winner.

GAMES WITH BALLS.

FIVES, OR TENNIS.—This is a very ancient game ; a tennis-court was a common adjunct to the mansions of our ancestors. It is played with small hard white balls, and a bat formed of a straight stick, about 30 inches long, with a circle of wire-work at the end, wherewith to strike the ball. The tennis ground must have at one end of it a tall wide wall, and a considerable area of good level ground in front. Bounds are to be marked by drawing lines horizontally along the wall, about three feet from the ground, across the ground about six feet in front of the wall, and again at a greater distance, as may suit the capacity of the play-ground or the inclination of the players. The bounds will be completed by drawing a line at each end of the cross lines, on the ground, to the wall, thus forming a square. The game may be played either singly or with partners. Having tossed up for innings, the winner begins by throwing the ball on the ground with such an impetus that it will rebound to a suit-



able height, and then with his bat driving it to the wall, above the chalk line, and so that it shall rebound over the first line but within the outer one. As it rises, the other player then strikes it in like manner against the wall, and so the game continues till one of them misses, or strikes the ball beyond the bounds, or fails to strike it before it has rebounded more than once. The game is fifteen, towards which the in-party counts one for every good ball made, and the out-party for every one missed ; the party in, losing the innings also as soon as a ball is missed. After the ball is started on each occasion of going in, it is not necessary that it should drop beyond the first line, that line being placed merely to make the first that throws the ball do it fairly for the other strikers.

TRAP, BAT, AND BALL.

NEXT to cricket, no game offers more amusement, both for sport and exercise, than Trap, Bat, and Ball; and its popularity is so universal, that we need not minutely describe the tools. The game may be played by two, or more, if the parties are divided equally on each side, in proportion to their assumed skill at the game. A number being agreed on as the game, each side will go in till the number is made, the innings are tossed for, and the first of the party to go in places the ball in the spoon of the trap, strikes the trigger gently with the bat so as to make the ball jump *into the air, and then with the bat either drives it as far as*

he can, or demonstrates his skill by propelling it to the spot at which there is the least likelihood of his being caught out. The out-players endeavour to catch the ball; but should they not do so, either before it falls or before it has rebounded more than once, the one by whom it has been stopped bowls or throws it at the trap. Should he strike the trap, the player is out; as he is also should the ball be caught, or fall within the bound which many players at this game draw in front of the trap, and at the sides of the play-ground; but if otherwise, the player scores one towards the game. The boundary-line is sometimes made also a running-crease, and any runs the player can perfect between that line and the trap before the return of the ball, are counted towards the game; but should the ball reach the trap before him, although it may not strike it, he will lose his innings.

EGG-HAT.

NEAR a wall or fence there must be as many holes dug, or caps laid down, as there are players. They must be large enough and open enough to admit of the ball being readily bowled into them. One of these holes must be assigned to each of the players. About five yards in front of the holes a line is to be drawn, at which one of the players places himself, and endeavours to bowl the ball into one of the holes. The player to whom the hole belongs immediately *picks up the ball, and* endeavours to throw it so as

to strike one of the other players, who all run off as quickly as they can. Should he miss, he has a stone put into his hole, which is called an egg, and has to take his turn at throwing at the holes ; should he, however, succeed in striking another, the party so struck has the egg. When three eggs are in one hole, the owner is out of the game. Thus the game is continued till all are out but one, and he is declared winner, and takes his choice of holes for next game. The practice of throwing the ball at the hands of the losers is a cowardly custom, and reminds us of hitting a man when he is down, or (as I have sometimes seen), a dog biting a cat all over when she was dead. All cruelty to fallen foes ought to be avoided ; if there is not fun enough in winning the game it is not worth playing at.

CATCH-BALL

Is somewhat similar to nine-holes, with this difference, however, that in lieu of using holes, the players stand in a circle, and the holder of the ball casts it into the air, calling on one of his companions by name to catch it. If the one so called succeeds in doing so before it has rebounded from the earth, he throws it up, and in like manner calls on some other playfellow to catch. Thus the game is continued till some one misses his catch, in which case he is to throw the ball after one of his playmates, trying to strike *him* ; if he again fail, he loses a point, and then throws the ball up, calling on some one by name, as before, to catch.



GAMES WITH MARBLES.

RING-TAW is generally played as follows:—A circle is formed, within which each party places one or more marbles, as may be agreed on. A shooting-line, called the offing, is drawn at an agreed distance, and from this line each player shoots his taw (as the marble thus used is designated) up to the ring. If he strikes one of the marbles out of the ring, he is entitled to take it up and to shoot again, so that a clever player, having won the chance of beginning the game, may clear the ring before his companions get an innings. This, however, is seldom accomplished, as no “dribbling” should be allowed. If a player shoot his taw within the ring before any marble has been struck out of it, he puts another shot in and shoots again, when it is his turn, from the offing. If a player’s taw gets within the ring, after a shot has been struck from it, the owner of the taw must put into the ring any shots he may have obtained in the game; but when *the marbles in the ring* are reduced to one, the taw

may remain in without bringing the player within this forfeiture. Even then, however, if any of the adversaries following can strike the taw, the owner of it has to give up all the marbles he has got during the game. Whoever gets the last shot has the privilege of aiming at one of the taws as they lie, and if he can hit it, he receives from the other all the marbles he has won in the game. After half the shots are out of the ring, any one who is struck by his adversary is out of the game, and has to give up all he has won from the ring.

LARGE RING.—Make a ring about two yards in diameter. Each player puts an equal number of marbles into the ring, about the centre. The first player then shoots from the edge of the ring, and tries to knock some of the marbles out, and keeps on until he misses. If his taw stops in the ring, he may shoot from there. If a taw be left in the ring, and any of those following strike it, the owner of it is out of the game, and must give up all the marbles he has got during the game.

THREE HOLES.—Make three holes in the ground, four feet apart, and draw a line about six feet from the first hole. The first player begins, standing at the line, by shooting into the first hole; if he misses, the next one takes his turn, and so on till all have gone. A player, after shooting his marble into a hole, may aim at his opponent's taw, if it is near; and if he can strike it he serves a fresh hole, and *from behind that* continues shooting into the holes or at the taws, as before. The player who gets first into the last

hole is not the winner until he has struck one of the taws, either from the hole or afterwards from the offing, or where his taw may rest. This is called "game shot." The holes must be gained in the following order:—first hole, second hole, third hole; second, first; second, third.

ODD AND EVEN.—Two boys play at this game. Having agreed who shall commence, the two players put out an equal number of marbles, and the one whose turn it is takes them in his hand and tries to pitch an even number of them into a hole made by the wall, from which he stands about five feet distant. If he succeed, they are his; but if an odd number remain in the hole, his companion takes his turn with them, and so on till one of them pitches an even number into the hole.

PITCH YOUR NICKER.—This is played either with marbles or *buttons*. Having made a hole at the side, and drawn a line about 8 feet off, one player takes an equal number of marbles to his own from his companion, and tries to pitch as many as he can into the hole at one throw. If any are left out, he then tries to hit one of them, which is fixed upon by his opponent, with his nicker. The nicker is a round piece of lead like a penny. If he succeeds, he takes up all. If he misses, he has only those in the hole. If he strikes another than the one fixed on, or if the nicker goes in the hole, he loses all. He has no need to throw with the nicker unless he likes to do so.

CHAPTER III.

GYMNASICS.

GYMNAStic exercises have the recommendation of not only improving, strengthening, and imparting grace to the muscular action, but by giving the gymnast a proper knowledge of his physical capabilities, they inspire him with the confidence that constitutes the main essential for extricating himself or others from situations of apparent danger. It is with great propriety, therefore, that a modified system of gymnastics has of late years become one of the subjects of school education.

In their broadest meaning, gymnastics comprehend every vigorous exertion of the muscles :—walking, running, jumping, hopping, vaulting, climbing, dancing, riding, wrestling, and swimming.

By way of preliminary caution, we may mention that Gymnastics should not be performed after a full meal ; that the upper clothes should be removed, and put on again as soon as the sport is over, as a protection against taking cold ; that boys should not attempt the more difficult feats till they have become thoroughly expert in the easier ones,

GYMNASTICS.





and that they should never practise with knives, peg-tops, or other toys about their persons.

A play-ground covered with grass or loose sand, to prevent injury from an occasional fall, is desirable; and a leaping-stand, horizontal bar or cord, parallel bars, vaulting-horse, leaping-pole, and a climbing stand, with ladders of wood and rope and a trapeze, are the appurtenances of a complete gymnastic ground: but many of these are not essential to the moderate course of gymnastics which we advocate, viz., walking, running, jumping, hopping, vaulting, balancing, and climbing parallel and horizontal bars.

Walking exercises should in schools be practised in classes. The head and body should be kept erect, the stomach held in, the shoulders back, the knees straight, and the toes turned out. The arms should be allowed to swing freely by the side, the feet be but slightly lifted, and advanced parallel with the ground. In slow walking, the foot should be advanced, keeping the knee and instep straight, and the toe pointing downwards; it should be placed softly on the ground, and this movement should be repeated with the left foot, and the action continued until it can be performed with ease and elegance. In moderately fast walking the ball of the foot must first touch the ground, and the toes should not be so much turned out. In the quick step, the body is thrown more forwards than in the other steps, the toes less pointed out, the knees allowed to be slightly bent and the heel first strikes the ground; the head, however, must still be kept erect.

RUNNING.—Run with an air of quietness, confining the action as much as can be to the legs, leaning the body somewhat forward, keeping the respiration restrained and the elbows bent. The feet should not be raised far from the earth, and the tread should be made on the ball, not on the extremities of the feet. There should not be needless clothing, to resist the air. Where running in a circle is practised, the course should be occasionally reversed, that the two sides may be equally exercised. The pupil should be taught to make his inspirations long, and his expirations slow, long wind being of the utmost consequence to a runner; but he must invariably cease running when his breath becomes short and painful. It is highly injurious to run immediately after meals. A mile in five minutes is good speed, although it has been done in four minutes and a half. To run four miles in twenty minutes, is a feat that only the best runners can accomplish.

JUMPING.—Bend the knees so as to bring the calves of the legs to the thighs, or the knees in a line with the thighs; spring from the toes; direct the arms towards the place to be jumped to, with a swing from behind; alight on the ball of the foot; hold the breath while performing the spring; incline the body forward as a safeguard against falling backward; let both feet come to the ground together; and if there be a run to the leap, commence with short steps, increasing their velocity and length as the jump is neared. No attempt should be made

to increase the height of the jump until the last has been cleared two or three times.

The leaping-stand is made of two upright posts, with holes bored through them, about one inch apart from each other, and in which two moveable pegs may be put at any height required; over the projecting ends of the pegs a line is laid, having a weight at each end in order to keep it straight, or a lath may be laid across: the leap being always taken from the side of the stand away from the pegs; if the gymnast's feet should happen to touch the cord, it is of course pushed off and drops immediately. The high-leap should be practised with a short run, which ought not to exceed ten paces; the feet must be kept close together.

HOP-STEP-AND-JUMP.—It is good practice in distance to see how great a length can be achieved by a hop, step, and jump, the two feet coming down at the end of the jump evenly.

PARALLEL BARS.—With the assistance of a couple of horizontals, fixed on uprights, as represented in the margin, various exercises may be performed that are calculated to develop and invigorate the muscles of the arms and chest. The first thing is to raise the body on the hands, as shown in the plate.

The body may then be swung backward and forward, till



by practice the toes be brought in a line with the nose. Next, the gymnast may learn to leap over one side of the bars while in full swing, by quitting the hold of one hand, while by muscular exertion he casts his body over the bar on which the other is still fixed as a fulcrum, and thus alights on his feet. Various other feats may be performed on the parallel bars, which will be suggested by practice.

HORIZONTAL BARS.—The first thing is to place the hands on the near side of the bar, and learn to elevate the body to its centre while in this position. Then reverse the hands to the other side of the pole, and repeat the experiment. When the pupil is well practised in the art of hanging by the hands, the feet may be brought into play by raising first one and then both on to the pole, while the body is suspended by the hands. He may make another movement by taking hold of the bar with his hands and swinging round, and while doing so, passing his feet between his hands, returning them back the same way, or else dropping on his toes to the ground. Other exercises may be performed, but not safely, without the presence of a gymnastic master.

BALANCING.—In gymnastics, balancing consists in standing on one leg, and performing various feats while thus poised; such as taking the raised leg in one or both of the hands, and, carrying the foot to the mouth or the back of the head, laying it on the shoulder. Another exercise is performed by extending the arms, raising one leg from the ground, sitting down and recovering the perpendicular,

without the use of the hands or the elevated leg. In some gymnastic grounds, a balancing-pole is fixed in a horizontal line at a slight elevation, on which the pupil, after some little guiding in the first instance, may speedily learn to walk, at first forward, then backward, and ultimately with the arms crossed either in front or behind.

WALKING ON STILTS will come easy to those who have familiarized themselves in the exercises enumerated.

LEAPING WITH A POLE, as commonly practised by the peasantry of the Pyrenees, is done by taking hold of the pole at about the height of the head with the right hand, and in the line of the hips with the left, placing the pole midway in the distance to be leaped, at the same instant making a spring with the right foot, and letting the body pass to the left of the pole, so as to alight with the face towards the space leaped from. *To leap into a hole, or from a height,* requires considerable practice and strength of arm. The gymnast is to place the pole on the spot to be reached, to grasp it with both hands, to let his hands slide down till his head is nearly in a line with his legs, then to withdraw his feet from their position, and, swinging round the pole, descend on the balls of his toes, with his face towards the spot he started from.

VAULTING requires an instrument called a vaulting-horse. It consists of a piece of timber, circular at the top and at each end, firmly supported on four legs. In the centre, what is called the saddle is formed by two ridges, so placed as to leave convenient sitting-room between them.

The ends and centre may be covered with leather, and stuffed with wool; or a leather case similarly stuffed may be made to fasten with buckles on any part of the horse. Leaping on to the horse is first to be practised, by placing the hands close together on one end of it, and springing on astride. This acquired, learn, instead of opening the legs so as to straddle the horse, to bring them up close together after the hands, and, with a little practice, you will be able to raise the body, and thus stand erect upon the horse. *To vault into the saddle*, place the hands on one of the ridges, and at the same time make a spring, turning the body simultaneously to one side, so that one leg may pass over, and thus seat you in the saddle. This may be done either with or without a run. *Vaulting sideways* is done by placing the hands as already directed, making a spring sufficient to throw both feet over the back, and then abandoning the hold of the hand so as to alight on the balls of the toes on the other side. *To vault on to, or over the saddle*, place a hand on each side, and proceed as directed for the other leaps.

CLIMBING THE ROPE.—Placing one hand above the other on the rope, grasp it also with the feet, by crossing the legs at the ankles. As you lift one hand above the other alternately, draw the feet up between each movement, so as to make them do their share in sustaining your weight. Sailors, however, instead of crossing the legs, pass the rope between their thighs, and bringing it across the calf of the leg, thus get it within the pressure of the feet. There

can be little doubt of this being the quickest and most certain mode of climbing the rope, but it is more likely to fray the clothes than the other, and therefore not so suitable for boys. In descending the rope, be careful to shift the hands as directed for climbing, and not to let the rope slide through them, as the friction is likely to lacerate the hands. The slanting rope is climbed and descended by precisely the same action, and is easier to begin with than the perpendicular.

CLIMBING THE POLE is done by encircling it with the legs and grasping it with the hands, as is done with the rope, with this difference, that the hands must not be shifted one over the other, but slid up together alternately with the legs. To descend the pole, relax the hold, without letting go with either hands or feet, and thus slide gently down.

CLIMBING THE LADDER.—As a gymnastic exercise, this is to be done from the under part, taking hold either by the sides or the runcles of the ladder. The hands are of course to be moved up alternately, to accomplish which, let the player bring the elbow of the lower arm as near down to the ribs as he can while lifting the other arm to the next runcle.

CLIMBING THE PLANK.—Place the plank at about the same angle as a ladder, or not so slanting, according to the strength or skill of the performer. The plank should be at least two inches thick, or it will have too much spring, and of about double or treble width. Place a hand on each

side, the feet flat in the centre of the plank, and progress by moving each alternately. Descend by short quick steps.

FLYING STEPS, OR GIANT'S STRIDES.—This is the most exhilarating of gymnastic exercises. It cannot be practised without the aid of proper apparatus, which consists of a mast or beam firmly fixed in the ground, with a strong iron cap on the top, made to turn freely on a pivot. From this depend four or more ropes, with a stick or bar at the end of each. Each player takes hold of one, and they then all vault off together in a circle, increasing their speed as they progress, till the impetus carries them through the air with great rapidity, almost without an effort. Indeed, when in full action, the knees may be drawn up to the breast, and the motion will go on, notwithstanding, for a considerable period. Another, and a better way, is for the players to start with a jump, throwing the legs out from the pole and describing a circle with them before they next touch the ground; then after a time two or three circles, or even more, may be described without the feet touching the ground. In this way the arms, instead of being drawn up, are at full length.

BOXING.—It is very good for boys to learn boxing, provided they mean to keep their temper, and never box without the gloves; at least, never, unless the stern duty of protecting the weak calls them to it. On this matter there cannot be better advice given to boys than the following manly words of Thomas Hughes, Esq., in his famous book "Tom Brown's School Days." We would, however, su

gest that we think the case rarely occurs where a challenge to fight need be accepted :—

“ Learn to box, then, as you learn to play cricket and football. Not one of you will be the worse, but very much the better for learning to box well. Should you never have to use it in earnest, there's no exercise in the world so good for the temper and for the muscles of the back and legs.

“ As to fighting, keep out of it, if you can, by all means. When the time comes, if it ever should, that you have to say ‘ Yes ’ or ‘ No ’ to a challenge to fight, say ‘ No ’ if you can—only take care you make it clear to yourselves why you say ‘ No.’ It's a proof of the highest courage if done from true Christian motives. It's quite right and justifiable if done from a simple aversion to physical pain and danger. But don't say ‘ No ’ because you fear a licking, and say or think it's because you fear God; for that's neither Christian nor honest. And if you do fight, fight it out ; and don't give in while you can stand and see.”

THE BOY'S HOLIDAY BOOK.

CHAPTER IV.

RIDING, ROWING, AND SWIMMING.



THE ESCAPE.



RIDING.



RIDING.

THERE is scarcely any exercise so conducive to health with so small an amount of fatigue as that of riding on horseback. It produces the measure of gentle perspiration so essential to the healthy condition of the skin, and may be continued a greater length of time than any other exercise.

It is best for a boy to begin to learn to ride on a pony; and Shetland or Welsh ponies are most commonly used for this purpose—an arrangement in perfectly good taste, as well as being adapted to the little legs that have to bestride the diminutive animal. The reverse of this is sometimes witnessed, and always suggests the familiar phrase of a "tomtit on a chopping-block," besides exerting a serious and damaging influence on the growth of the lower part of the young gentleman, who should remember, and his friends for him, that he has to *make his own legs*. Many have been made bandy-legged for life by too continuous a use of horse-exercise, especially where the breadth of the animal's back is disproportional to the size of his rider.

Without wishing to make our boys "horsey," which is anything but an enviable or creditable accomplishment, it may be as well to advert to one or two points in the qualities and treatment of so noble an animal. There are few horses that are equally adapted for riding and driving. A rider ought to have a goodly portion of his beast before him, in the shape of substantial shoulders and elevated neck.

The age of a horse is generally determined by his teeth,

of which, like his young rider, he has two sets in succession; the first pair of *permanent* teeth in front showing themselves in the third year, and the whole of them when he is "rising" five, *i. e.*, when he has passed his fifth year. When the front teeth (or nippers) first appear, a deep black mark is shown in the centre of the surface which comes in contact with the food, and which is, by eating, gradually worn down until about the sixth year, when it disappears. By observing this mark, a practised eye will determine the age of the horse up to that period, after which the animal comes under the general appellation of an "aged" horse, the word *aged* being pronounced as one syllable.

The height of a horse is measured by *hands*, a hand being four inches, or the average breadth of a man's hand, and is taken from the ground to the withers of the horse, or the part just over the shoulder. A Shetland pony would not exceed nine or ten hands, and a horse seventeen or eighteen hands would be remarkably tall.

In the treatment of the horse, as in that of his superior, nothing is so powerful as kindness. There are few vicious horses that have not been made much worse either by foolish teasing or brutal severity. Ponies are proverbially mischievous, owing, we believe, entirely to being early subjected to the former of these modes of treatment by ignorant grooms or stable boys. By gentle treatment and coaxing they may be led to any amount of docility. An encouraging word and a pat of the neck will soon cure a horse of shyness, when beating will infallibly secure the repetition of

the evil by associating any unwonted object with the chastisement. It is, however, equally essential for a horse clearly to understand who is master : a firm determination without passion will not fail to enlighten him on this point.

For a very young rider, a pad is every way preferable to a saddle, and the stirrups should be always of sufficient weight to keep the foot well in its place. A spring stirrup is useful to release the foot in case of accident.

The bit of a snaffle bridle consists simply of two short bars, with a link or joint in the middle and a large ring at each end, in which the rein is inserted, and is the most ordinary form of bit, where the horse is tractable and not hard-mouthed. The curb bridle has a bit, which is a bar arched in the middle, with a cross-bar at each end, acting as a lever by the insertion of the rein at or near the extremity. This gives great power over the mouth of the horse, especially with the addition of a curb chain under the chin. This, however, is not often necessary, and must be used with caution and with a firm yet gentle hand. An additional security is sometimes used where any tendency to rear is displayed : this is the martingale, one end of which is attached to a cross strap, which unites the two reins, and passing between the fore-legs, fastens to the girth. A crupper, or strap, buckled behind the saddle, and passing by a loop under the tail, is also useful to prevent the saddle from getting too forward, when the horse is low in the shoulders.

Before mounting, the rider should use himself to glance at the shoes of the horse, to see that none are loose or miss-

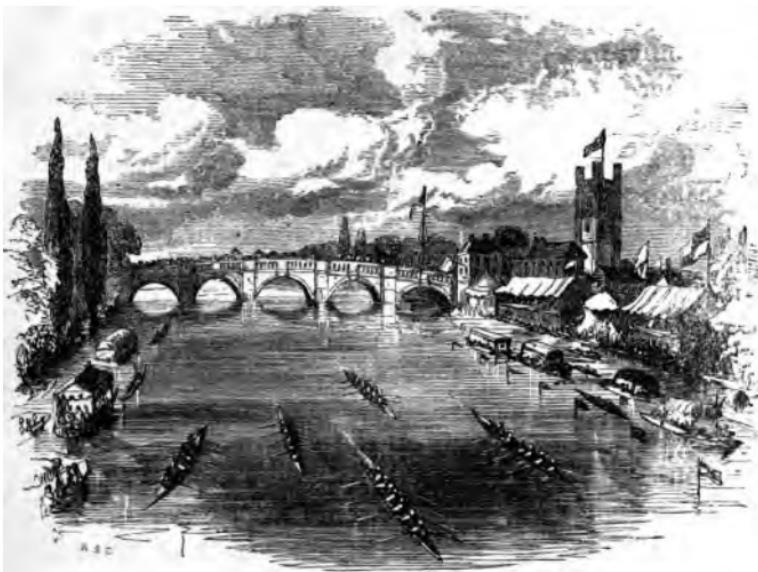
ing; also that the saddle is well girthed and the bridle easy; especially that the strap passing under the neck is not tight.

In mounting, the rider should place himself on the near or left side of the horse, with his left side to the shoulder of the animal; then placing his left foot in the stirrup on the outer side, grasp the bridle, with a tuft of the mane and the pommel in his left hand, raise himself with a light spring into the saddle.

Much of the success in riding depends upon the manner of sitting. A rider on horseback will not do quite well to imitate a new moon or the bowsprit of a ship. An upright position is both graceful and commanding; the face should be straight to the horse's head, the thighs pressed firmly, but moderately, against the saddle, except when the rider finds a difficulty in keeping his seat, when the tight pressure of the thighs is his chief stay. The toes must be slightly turned out, and the heel kept low. The tread of the stirrup should be on the broadest part of the foot. The arms should hang easily close to the side, the elbow-joint being the one most in use for guiding the horse. A beginner will do well to use both hands with the bridle, the reins passing between the thumb and the little finger. After a little practice the left hand will generally suffice, leaving the other free for the whip, which instrument, however, should rather be for ornament than for use. Whether riding or driving, never hold a whip pointing away from the body; but in the former case, either down the side or across in

front; in the latter case, invariably so. In using the left hand only, pass the ends of the bridle over the fore-finger, the other fingers being between the reins. Keep the bridle hand down, just clear of, but never touching, the pommel of the saddle. One of the worst vices in a rider or driver is that of hurrying the horse on at starting, and especially before being properly seated. You may in this emulate the accomplishments of a butcher's boy, but to complete the business, you should ride bare-headed, with hair duly greased, and you will then infallibly make your horse an unsafe beast for any except those who are fond of getting into a train while on the move. Nothing is more indicative of a gentleman than a composed and deliberate way of beginning anything. A canter is an easy pace for a little boy who is just venturing his horse beyond a walk; but a trot is the best pace to which to accustom both horse and rider; being least fatiguing in a long journey, and the most graceful.

There are, perhaps, few people who are aware of the fact that, in trotting, the hind and fore-foot of the same side meet each other, while those on the opposite side are separated at the greatest distance from each other. In adapting himself to the motion of a trot, the rider must avoid the awkward practice of raising himself out of his seat more than is essential. We will finish by saying that every boy ought soon to learn how both to saddle and harness his horse.



HENLEY-ON-THAMES.

BOATING.

"WELL, my man," said a grave Professor to a boatman who was rowing him on one of the North American lakes, "I suppose you never studied mathematics?" "No, sir, indeed, I never did." "Ah well, I always feel," said the scholar, "that the man, whoever he may be, who has not studied mathematics has lost a *third of his existence*." Presently, one of those squalls, so frequent in inland lakes, came sweeping over the water; the little craft seemed as though she must upset, and the Professor, in alarm, asked his boatman if

BOATING.





there was much danger. "Can you swim, sir?" was the rejoinder. "No, indeed, I never learned." "Ah, well," replied the boatman, with a grin, "take care that you don't lose the *whole of your existence.*"

What the American boatman said to the Professor, we would say to all boys who go boating. We would with all earnestness urge them to lose no time before beginning to learn to swim, and to think no pains too great to acquire it. To those who can swim, there is as little danger in this sport as in any other. It is splendid exercise, and is, perhaps, superior to anything else for the way in which it brings all the muscles into play.



THE FUNNY.

Boating is to the river what cricket is to the field. There is no good boating without self-restraint—indeed, in a rowing-match, each rower has more completely to lose his own personality in that of the crew than the cricket-player has

in his eleven. There must be the great personal exertion of each one, but it ought to be so exactly after the style of the "Stroke," that all the oars should go as one. Whoever had the delight of seeing the Oxford crew pull under Hammer-smith Bridge, at their match in 1864, with Cambridge, must, indeed, have felt the truth of this. The one great sweep of the *dark blue* told a tale not only of tremendous exertion, but of wonderful obedience on the part of each follower to the man who was what is termed "the Stroke."



THE WHERRY.

Grasp the oar, with one hand on the handle (*with the thumb as well as the fingers above it*), and the other on the loom, that is, the part between the row-lock and the handle, keeping the elbows well in at your sides. Next, thrust the arms forward, and follow the motion with the body from the thighs. Now raise the handle slightly, so as to drop the oar into the water; pull straight away till you

reach the perpendicular, or are slightly inclined out of it. Resume again the position with which you started.

In these pages we cannot give sufficient directions for any one to teach himself rowing. It can only be learnt by carefully watching an experienced oarsman, or, still better, by getting one to show you how to go about it. Nevertheless, there are many hints and directions which are worth



THE SKIFF.

careful attention on the part of those who wish to row in good style.

To the boy who does not know at all how to use his oar, our first advice is not to have any regard to what is termed feathering, or any of the refinements of rowing. The oarsman should look at the handle of the oar, and not at the water. This handle may, in its movement, be made to describe the shape of an egg rather flattened at the sides.

This last direction, of course, only applies to beginners ; by following it, the oar will dip too much in the water, but we are quite sure that rowing may be learned soonest by first simply trying in this way to get the swing. Having thus far obtained ease in the use of the oar, the next thing is to see that the blade does not dip in the water too deeply, and that it retains the same depth so long as it is in the water. In other words, though rowing "round" is the easiest way



EIGHT-OAR CUTTER.

to begin, *it must be avoided directly* you feel sufficiently at home with your instrument to attend to its proper working. No one ought to attempt to row in an outrigger who has not become expert with his oars. All such things as "catching crabs," or sculling unevenly, should be out of the question with any one using these light boats. We add a few cautions against faults into which rowers are apt to fall :—

1. Do not bend forward until you take the fresh stroke. Bending forward at the end of the stroke is called "meeting the oar ;" it loses much power.
2. Do not row round ; to avoid this, drop the blade to its proper depth, and pull straight through.
3. Do not shirk ; that is, do not take the oar from the water before the "stroke" takes his, and then finish the stroke in the air, so as to keep time. This is, perhaps, the worst fault in rowing.
4. Do not bend the elbows out from the side.
5. Do not look at your oar to avoid "crabs ;" you are more likely to catch them by so doing. Any looking from the boat is bad, as you thereby lose the swing. This is very important for beginners, as, by looking at the water, instead of right before them, they often bring the handle of their oar into disagreeable contact with the back of the rower in front. If you should catch a crab, which is a thing of frequent occurrence to beginners, throw the handle of the oar quickly up from the rowlock, and no harm will come of it.
6. Keep a good straight back, and even in reaching forwards never round the shoulders.

Feathering the oar is accomplished by bending the wrist back, and so changing the blade from a perpendicular to a horizontal position, carrying it through the air. Let your style of stroke be steady and free from jerk. Its length must be secured more by bending well forward over the toes before dropping the oar, than by drawing back at the end.

SCULLING.—In sculling one boy takes both sculls. He sits in the middle of the boat and pulls them exactly as described in rowing with the oar. It is of great importance, both for your *style* and *safety*, that you begin with a wide



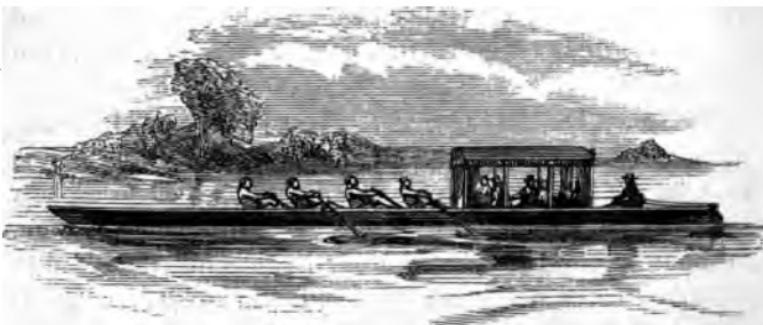
RACING BOAT.

and steady boat. The handles of the sculls generally overlap each other about four inches, but it is well at first to try in a boat wide enough for the handles not to meet, as many an awkward rap on the knuckles will thereby be saved.

STEERING.—Keep your rudder lines as taut as possible. When compelled to use them, be careful to do so no more than is absolutely necessary. You will thereby avoid having to rectify the course by steering back, and so impeding the motion of the boat. Every unnecessary turn of the rudder is a loss of power. In turning a boat round, never trust to the steering alone, but let one side "hold water." If going down the stream, keep the middle, and let all boats pass on the near side; you thereby let them have the advantage of the slack water, and you keep that of the stream.

A well-trained boat's crew ought to be completely under the direction of the coxswain; but when the coxswain is a

stranger, or not sufficiently versed in his art to give the necessary directions, the "stroke" should do so in his place.



THE SHALLOP.

Nothing has been said about sailing, but no boy ought to think of doing this without some one in the boat who thoroughly understands it, and it is much better to learn from such an one than from any description in books.

One word more, by way of caution: remember a boat is no place for silly play. If you go boating, it should be for the pleasure of rowing, and not playing tricks. More lives are lost from childish sport with a boat than in any other way.

SWIMMING.

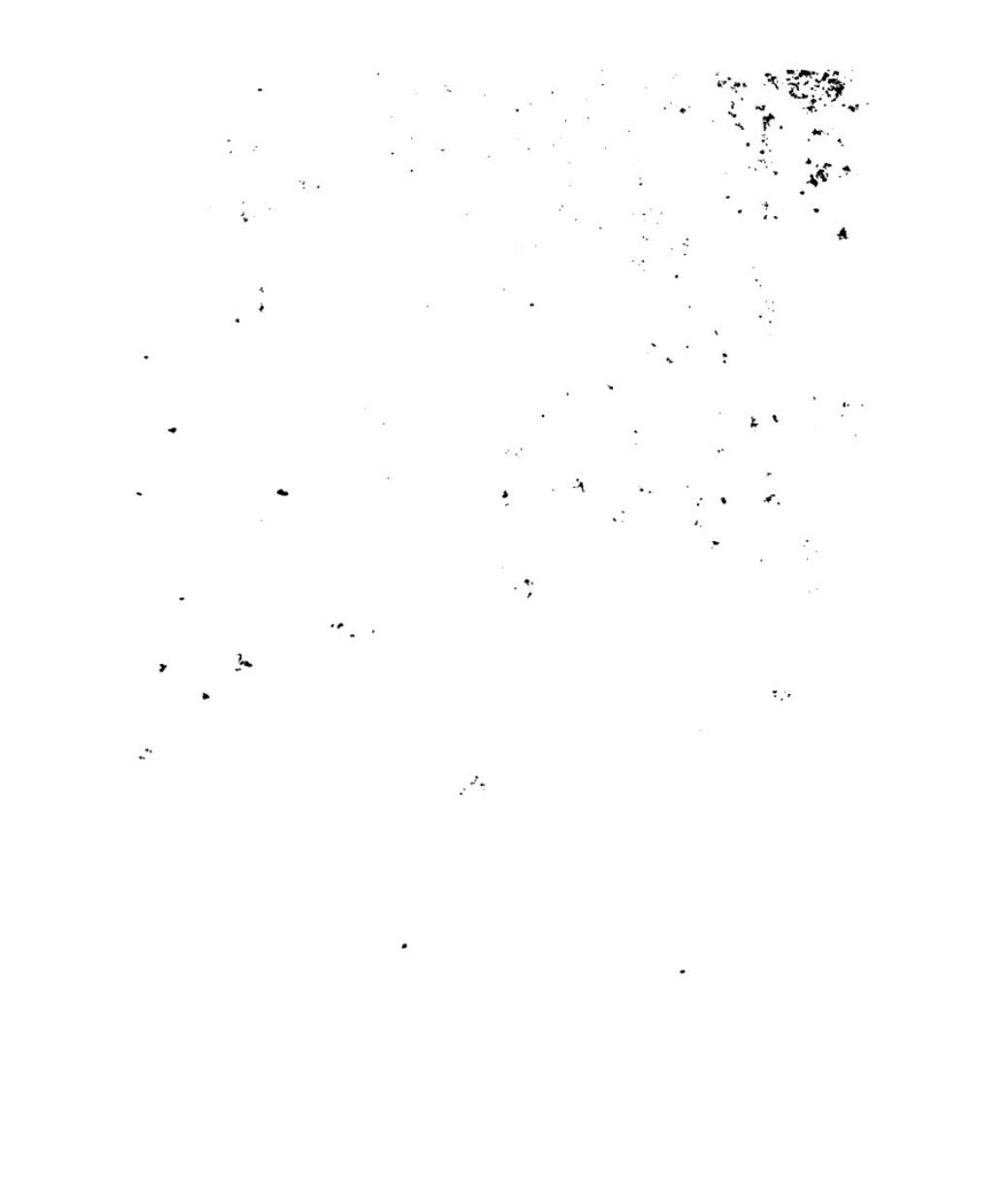
It is universally admitted, that a knowledge of the art of swimming is both a useful and elegant accomplishment, and it is much to be regretted that greater pains are not taken to learn it.

That man has not the same, or an equal facility in swimming with many of the inferior animals, is a fact which is familiar to every one, and can be easily accounted for. Whilst other animals are possessed of instinct, by which, without any process of reasoning, they are invariably led to the adoption of the means that are most suitable for the attainment of the end, man, in this, as well as in an infinite variety of other instances, is chiefly left to the guidance of his reason ; and all reasoning must favour the cultivation of the art of swimming.

In addition to its advantage as a healthy and bracing exercise, humanity alone, the pleasure of being not only able to preserve our own lives, but those of others, ought certainly to be sufficient inducement to acquire a dexterity in this most useful art. When it is considered that we have such a long sea-coast, and that in the interior, rivers, brooks, lakes, and artificial canals abound, it may seem surprising that such a proportionately small number of our inhabitants can swim. It might have been much more naturally inferred that every inhabitant of our island would feel almost as much at ease in the water as on dry ground. The upsetting of the

SWIMMING.





slender boats of the natives of Otaheite is to them a subject of merriment; they swim about, catch hold of the light vessel, right her again, and paddle away, never considering they have been in any danger. Were the practice of swimming universal in this country—and it might be so—we should hardly ever hear of deaths by drowning.

Every one's body is specifically lighter than water, therefore every one may learn how to swim; but it is by repeated practice alone that perfection in the art can be attained: and in this it resembles every other art. When once gained, it never can be forgotten, and may prove of the most essential service to persons exposed to hazard by sea, or who are accidentally thrown into the water while boating. Let it never be forgotten, that we ought in such cases to be particularly careful to maintain the greatest composure of mind, and not to rely too much upon our acknowledged expertness in the art; for in the hurry and confusion which naturally attend such scenes, we are too often apt to be rash in our calculations, and thus run into unnecessary danger.

GENERAL REMARKS—TIMES AND PLACES FOR BATHING, &c.—The sea is the best for bathing, running waters are the next, and ponds the worst. The numerous public baths about the metropolis, and in most towns of even moderate size, have many advantages, and are infinitely less objectionable than ponds, on account of the care taken to have a constant change of water. The times at which bathing is most wholesome are the months of May, June, July,

August, and September. It is not advisable to bathe in rainy weather, as rain, if it lasts, speedily chills the water, and subjects to cold by wetting the clothes. Night is also a bad period, as it is unsafe to expose the naked person to the night air. If possible, select a place with a bottom of gravel or smooth stones, so that you may stand thereon as freely as on the earth, without danger of either sinking in mud, or wounding the feet. Avoid a weedy bottom, as, although you may have companions, your feet may become entangled when their attention is diverted, and you thus be lost before they are apprised of your danger. You should never plunge into water that you have not first plumbed. If ever so good a swimmer, it is important to be sure that you can plunge in without danger of striking the bottom : if not so well experienced, it not only gives confidence to know that the bottom is within safe reach, but as the novice is early tired, it is indispensable that the bottom should not be out of his reach when he has occasion to take rest.

CORKS, BLADDERS, AND OTHER AUXILIARIES.—The use of corks, bladders, &c., is as strongly reprobated by some as it is commended by others. That the necessary action may be more easily taught with them than without them, is undeniable ; but confidence is the great essential to good swimming, and if the learner cannot command this without corks, he is not likely to acquire it any the more quickly by the use of them. Our advice is, to use corks for a part of the time while in the water, and then resolutely to throw your-

self on the water and to persevere in trying to repeat the action without the corks. Above all, do not venture out of your depth unless you can swim without corks.

Swimming-corks consist of three or four rounds or slices of cork, of progressive sizes, run, by a hole made through the centre, on to both ends of a stout cord, with a knot well secured at each end. The cord should be somewhat longer than the breast of the swimmer is wide, so as to admit of the corks floating round to his back. The swimmer is to lay his chest on to the cord, letting it pass close under his arms, and the corks will then take their proper positions. Bullocks' bladders, inflated, will answer the same purpose ; but, as their buoyancy depends altogether on their continued inflation, and there is the danger of the air escaping, from the mouths of the bladders being insecurely tied, and other casualties, we do not recommend their adoption where corks can be obtained. It may be here observed that the hands and arms are mainly serviceable in swimming for the purpose of keeping the body in buoyancy. The legs are the implements of progression ; and the best argument that can be advanced in favour of the use of corks, &c., is that, by not occupying the attention of the learner with the necessity of using his arms in the way indicated, he will be the more likely to perfect himself in the management of the limbs essential to his rapid progression. For this purpose, other expedients are often adopted. A rope is sometimes fastened, so as to reach the water, from an overhanging bough or a projecting post, by taking hold of which, the learner

may dispense with the use of his hands while practising the action of his legs. But a better plan even than this, where there is space enough of water to admit of it, is to have a plank floating on the bath. The least hold of this plank will prevent the learner from immersion, and he will have the gratification of testing the efficiency of his operations by the rate at which he moves with his floating protector.

OF GOING INTO THE WATER.—Those who do not know how to swim, ought to enter by degrees, and gently, into the water; but those who are expert may leap in at once, with their head or feet perpendicular to the bottom. Others hold their right hand or both hands behind their neck, and cast themselves in head foremost, striking the water with the calves of their legs one after another. Some, after a short race, fling themselves into the water on their right or left side. Others, taking a short run towards the bank of the river, leap in with their feet foremost, and body upright, meeting the water first with their buttocks and the calves of their legs. This way is very safe, and therefore to be recommended, but great care must be taken to keep the legs together.

It sometimes happens that those who are least expert go to the bottom, which is unpleasant, by reason of sometimes striking against it, and that in a great depth you are obliged to hold your breath longer than is agreeable; but you may remedy that by turning on your back as soon as you begin to approach the bottom, for you will cease descending as *soon as you begin to turn yourself.* A simpler way than

this is to project the head or the feet forward, according as you dive or jump in. By this means you may jump into comparatively shallow water without touching the bottom. Whatever the mode of entering the water, it is generally agreed that the head should be the first part wetted; so that, if the bather does not adopt the plan of plunging in head foremost, he should sluice it with water before walking in. Some, however, find it more healthy not to wet the head at all.

To BEGIN TO LEARN TO SWIM.—It is sometimes a good plan, on first entering, to make a plunge, and then take a short run along the bank before indulging in the exercise of swimming; you will not then be so liable to feel chilly; but you must not delay on the bank, or often get in and out. Do not remain over long in the water: leave it before you feel tired or chilly. To put yourself in a right posture for swimming, lie down gently on your stomach, keep your head and neck upright, your breast advancing forward, your back bending, withdraw your legs from the bottom, and immediately, but not hurriedly, stretch them out *in imitation of a frog*; strike out your arms forward, and spread them open; then draw them in again towards your breast, strike forward, using first your feet, and then your hands, and making as many strokes as you can. If these instructions



are attended to, you will swim. You need not at all fear lying along the water when you know the bottom. It will sometimes happen that you swallow some water, but that ought not to dishearten you, for the same thing happens almost to all beginners. Do not be discouraged if at first you find you go under the water, but keep on. While you are going down, take care to shut your mouth. You will easily regain your position.

The novice in swimming should take special care that the water be not higher than his breast, nor shallower than up to his belly, and should always swim towards the bank or parallel to it.

To TURN WHEN SWIMMING.—Incline your head and body to the side you wish to turn to, and at the same time move and turn your legs, after the same manner as you would to turn the same way on land: this at once stops the motion of your body forwards.

If you wish to turn to the left, you must turn the thumb of your right hand towards the bottom, and with the palm open, but somewhat bent, drive off the water from that side; and, at the same time, with the left hand open and the fingers close, drive the water on that side backwards, and at once turn your body and face to the left. If you would turn to the right, you must do just the same thing contrariwise.

To FLOAT AND SWIM WITH THE FACE UPWARDS.—It is strange that so many should die by drowning while floating is so simple, and so sure, that if a person will only put him-

self in a floating position he cannot sink ; and this is accomplished by turning himself on his back, keeping his body extended in a right line, and placing his hands on his stomach, or extended at a right angle, or at his side.

This done, the best of divers cannot descend without elevating their arms, and contracting the thorax or breast ; and then their descent will be very gradual. As long as you can hold your breath and keep this position, you will float without further effort, and you can also keep yourself floating during respiration by gently paddling with the hands by the sides of the hips. But many do not need this.

To SWIM IN THE FLOATING POSITION.—To do this you must turn yourself on your back as gently as possible. Strike out with the legs, taking care not to lift the knees too high, nor sink your hips and sides too low ; but keep in as straight a line as possible. You may lay the arms across the breast, place them motionless at the sides, or strike out with them to help you on.

To swim with the feet forward, while on your back, lift



up your legs one after the other, let them fall into the water, and draw them back with all the force you can towards the hams. You may also help this motion with the hands.

To TURN LYING ALONG.—It would seem, at first sight, as if to turn oneself, and to turn oneself lying along, were the same thing. But to turn lying along, you must keep in an extended posture, and lying on the back, the top of your arms close to your sides, turning the lowest joint of your right hand outwards, the legs at a distance one from another at least a foot, or thereabouts, and the soles of your feet turned towards the bottom of the water. In this posture, you may turn as you please towards the right or left side. These different modes of turning are very serviceable, in case of running into weeds or against a bank. The following, however, is another way of disengaging oneself from weeds :—

ANOTHER WAY OF TURNING OR ROLLING ROUND.—There is a way of turning round as a globe does about its axis. If you are swimming on your stomach, and would turn to the left, extend your right hand and arm as far out before you as you can, and turn your face, breast, and whole body, to the left, lifting up your right hand towards the top of the water, and you will find yourself on your back, and from your back you may turn again on your stomach, and so on as often as you please. Take care to keep your legs close together, and your arms stretched out before your breast, but not separated from one another.

THE TURN CALLED RINGING THE BELLS.—You have no

need of much room for this mode of turning, and may do it either swimming on the back or stomach. If you are swimming on the stomach, draw in your feet and strike them forwards, at the same time striking out your hands backwards, and putting your body in an upright posture.

If swimming on the back, draw in your legs towards your buttocks, and, striking them down towards the bottom, cast your body forwards till you are turned on the stomach ; but take heed that you have water sufficient, and that there are no weeds at bottom, as, if you either strike the bottom or get your legs among the weeds, the consequences may be serious.

To ADVANCE WITH THE HANDS JOINED TOGETHER.—This is one of the most simple ways of swimming, and is also very graceful. In the practice of it you hold your hands joined together, successively drawing them in towards the breast, and striking them out again. The two hands remain all the while joined, and the thumbs and fingers, being turned towards the surface of the water, seem to be out of it. Besides the gracefulness of this way of swimming, it is also serviceable for traversing or swimming across a heap of weeds, &c. ; for the hands, being thus oined as it were in a point, open a passage for you, especially if you take care not to strike them out too far.



To SWIM ON THE SIDE.—While swimming on the back or stomach, lower or sink the left side, and at the same time elevate the right one. When thus laid, move the left hand as often as convenient, without separating it far from the body, or sinking it, perpetually striking it out and retracting it as in a right line on the surface of the water. Or strike out to its full stretch, and press it down straight to the bottom, bringing it up again in a circle under the left side. By this mode of swimming, you may rest one side while the other is employed.

To SWIM ON THE STOMACH, HOLDING BOTH HANDS STILL.—This is easily performed; keep your breast advancing forward, your neck upright on the water, both your hands fast behind your head, or on your back, or your arms folded across the chest, while in the mean time your legs and thighs push you forwards by the same motions you make when swimming in the ordinary way. This way of swimming may be useful in case of cramp happening to your arms.

To CARRY THE LEG IN THE HAND.—When swimming on the stomach, if you lift up one leg, and, moving it towards the buttocks, take hold of it with the hand of the opposite side, you may continue to swim with the leg and other hand which are at liberty.

To SWIM LIKE A DOG.—To swim like a dog, lift up and



depress one hand successively after another, and do the same also with the feet, with this difference only, that with the hands you must draw the water towards you, and with the feet drive it from you. Begin with the right hand and right foot, following with the left hand and foot, and so successively.

To BEAT THE WATER.—When swimming on the back, at each extension of the legs, lift them up out of the water, one after the other, and strike the water so that it will rebound into the air. Those who are most expert at this bring their chins towards their breast at each extension.

To KEEP ONE FOOT ABOVE THE WATER.—Keep the breast inflated, the palms of the hands extended and turned downwards toward the bottom, and the other leg constantly employed in the water; for, if you omit any of these precautions, your head immediately sinks down.

To SHOW BOTH FEET OUT OF THE WATER.—It is practicable not only to float with both feet out of the water, but also to make advances forward. Place yourself on the back, and bend the small of it contrariwise to what is practised in other ways of swimming; the hands must be on the stomach, the palms of them open, moving them to and fro like oars, which must sustain the body while the feet are shown.



To SUSPEND YOURSELF BY THE CHIN.—By this means you may apparently stand upright in the water, though ever so deep. To make you comprehend, remember, that when you swim on your back, you lie still, your legs being extended ; when in that posture, you are to let your legs go down or sink ; and when they come to the perpendicular, you must take them up again, bending the knees, and inflating the breast, extending the arms and hands sometimes on one side, sometimes on the other, and sometimes shutting them, turning the palms towards the bottom, the fingers close to one another, holding your chin as upright as possible. This mode of sustaining the body is very useful to skaters, if the ice should happen to break under their feet.

To TREAD WATER.—By this feat you remain upright in the water without making any motion with your hands, only you move the water round with your legs from you, the soles of your feet being perpendicular to the bottom. Treading the water has also the advantage of allowing the free use of the hands.

To SWIM WITH THE LEGS FASTENED TOGETHER.—The legs being bound either by weeds or otherwise, turn on your back, and lay your hands across on your breast, for in that posture you may gain the shore, by striking your legs one against another, and holding them up as much as you can.

To SIT IN THE WATER.—To sit, you must take both your legs in your hands, draw in your breath, and so keep your breast inflated, your head upright, and lifting up

successively your arms and legs, by that motion sustain yourself.



To SWIM HOLDING UP BOTH HANDS.—While swimming on your back, it is easy to put your hands to what you please, but it is difficult to hold them upright, and swim at the same time. This is, however, to be acquired by practice. You must take care, while you lift up your arms, that the thorax or breast be not contracted, for in that case you sink ; the whole art of this way of swimming consisting in heaving up the breast high, and keeping it as inflated as possible.

DIVING.—If people sink to the bottom of the water, it is their own fault—nature has laid no necessity on them for doing so ; indeed, there is occasion for some degree of force and strength to effect it safely, speedily, and handsomely ; but the expert in swimming do it as swiftly as an arrow, and descend perpendicularly or obliquely, as they please. Begin with your feet touching the bottom ; then rise up, your head bowed down so that your chin touches your breast ; turn the crown of your head towards the bottom,

holding the backs of your hands close together, right before your head, and sinking or striking them down with all the swiftness and exactness you can muster ; and thus you may dive to the bottom.

To dive from a height into the water, as from a bridge or ship, take a leap a little forward, and sometimes upward, that your descent may be perpendicular and swift, and also that your head may go perpendicularly downward, which is the best way when you have very deep water, on account of the difficulty of holding the breath for any length of time.

In returning to the surface of the water, you will, of course, make the shortest cut right upwards, using both hands and feet, as in common swimming, or by swimming like a dog.

To SWIM UNDER WATER.—This may be accomplished by the ordinary stroke, taking care to keep your head a little down, and to strike a little higher with the feet, than when swimming on the surface ; or the thumbs may be turned downward, and the stroke performed in that position, instead of keeping them flat. But the best way is to keep the hands joined in front of the head, and to kick with the legs as quickly as possible.

THE CRAMP.—A treatise on bathing would be incomplete without a mention of this, the bather's bane ; and the best



reason that can be adduced for perfecting himself in the various modes of swimming herein detailed, is that, by the adoption of one or other of them, he may reckon on escaping the danger that this visitation undoubtedly subjects the swimmer to. At the same time, we feel bound to say, that a person habitually liable to cramp should not bathe in situations where assistance may not be immediately available. To a tolerable swimmer, however, there is little danger if he maintains his self-possession. Cramp is a contraction of the sinews of the legs or arms generally. The moment you feel it, if in the leg, strike out the limb with all the energy you can muster, without regard to the temporary pain you will have to endure, thrusting the heel out and drawing up the toes. If the cramp be in the arm, which is much less likely, adopt the like plan, shutting and stretching out the fingers with firmness. If the contraction do not yield to the first or second effort, throw yourself on your back, and endeavour to keep afloat till either the affection relapses or you obtain assistance. Out of the reach of aid, with calmness and decision, by one or other of the modes of swimming herein inculcated, you will be almost sure of paddling to the shore.

DR. FRANKLIN'S ADVICE TO SWIMMERS.—The only obstacle to improvement in this necessary and life-preserving art is fear ; and it is only by overcoming this timidity that you can expect to become a master of the following acquirements. It is very common for novices in the art of swimming to make use of corks or bladders to assist in keeping the body

above water ; some have utterly condemned the use of them ; however, they may be of service for supporting the body, while one is learning what is called the stroke, or that manner of drawing in and striking out the hands and feet that is necessary to produce progressive motion. But you will be no swimmer till you can place confidence in the power of the water to support you. I would, therefore, advise the acquiring that confidence in the first place ; especially as I have known several who, by a little practice necessary for that purpose, have insensibly acquired the stroke, taught, as it were, by nature. The practice I mean is this : choosing a place where the water deepens gradually ; walking quietly into it till it is up to your breast ; then turning round your face to the shore, and throwing an egg into the water between you and the shore ; it will sink to the bottom, and be easily seen there if the water be clean. It must lie in the water so deep that you cannot reach to take it up but by diving for it. To encourage yourself in order to do this, reflect that your progress will be from deep to shallow water, and that at any time you may, by bringing your legs under you, and standing on the bottom, raise your head far above the water ; then plunge under it with your eyes open, which must be kept open before going under, as you cannot open the eyelids for the weight of water above you ; throwing yourself toward the egg, and endeavouring, by the action of your hands and feet against the water, to *get forward*, till within reach of it. In this attempt you *will find that the water buoys you up against your inclina-*

tion ; that it is not so easy to sink as you imagine, and that you cannot, but by active force, get down to the egg. Thus you feel the power of the water to support you, and learn to confide in that power ; while your endeavours to overcome it and reach the egg, teach you the manner of acting on the water with your feet and hands, which action is afterwards used in swimming to support your head higher above the water, or to go forward through it.

I would the more earnestly press you to the trial of this method, because though I think I shall satisfy you that your body is lighter than water, and that you might float in it a long time with your mouth free for breathing, if you would put yourself into a proper posture, and would be still, and forbear struggling, yet, till you have obtained this experimental confidence in the water, I cannot depend upon your having the necessary presence of mind to recollect the posture, and the directions I gave you relating to it. The surprise may put all out of your mind.

Though the legs, arms, and head of a human body, being solid parts, are, specifically, somewhat heavier than fresh water, yet the trunk, particularly the upper part, from its hollowness, is so much lighter than water, as that the whole of the body, taken altogether, is too light to sink wholly under water, but some part will remain above, until the lungs become filled with water, which happens from drawing water to them instead of air, when a person, in the fright, attempts *breathing*, while the mouth and nostrils are *under water*.

The legs and arms are specifically lighter than salt water, and will be supported by it, so that a human body cannot sink in salt water, though the lungs were filled as above, but from the greater specific gravity of the head. Therefore a person throwing himself on his back in salt water, and extending his arms, may easily lie so as to keep his mouth and nostrils free for breathing; and, by a small motion of the hand, may prevent turning, if he should perceive any tendency to it.

In fresh water, if a man throw himself on his back, near the surface, he cannot long continue in that situation but by proper action of his hands on the water; if he use no such action, the legs and lower part of the body will gradually sink till he come into an upright position, in which he will continue suspended, the hollow of his breast keeping the head uppermost.

But if, in this erect position, the head be kept upright above the shoulders, as when we stand on the ground, the immersion will, by the weight of that part of the head that is out of the water, reach above the mouth and nostrils, perhaps a little above the eyes, so that a man cannot long remain suspended in water, with his head in that position.

The body continuing suspended as before, and upright, if the head be leaned quite back, so that the face look upward, all the back part of the head being under water, and *its weight*, consequently, in a great measure supported by *it*, the face will remain above water quite free for breath-

ing, will rise an inch higher every inspiration, and sink as much every expiration, but never so low as that the water may come over the mouth.

If, therefore, a person unacquainted with swimming, and falling accidentally into the water, could have presence of mind sufficient to avoid struggling and plunging, and to let the body take this natural position, he might continue long safe from drowning, till, perhaps, help should come; for, as to the clothes, their additional weight when immersed is very inconsiderable, the water supporting it; though, when he comes out of the water, he would find them very heavy indeed.

But, as I said before, I would not advise you, or any one, to depend on having this presence of mind on such an occasion, but learn fairly to swim, as I wish all men were taught to do in their youth; they would, on many occasions, be the safer for having that skill; and, on many more, the happier, as free from painful apprehensions of danger, to say nothing of the enjoyment in so delightful and wholesome an exercise. Soldiers particularly should, methinks, all be taught to swim; it might be of frequent use, either in surprising an enemy or saving themselves; and if I had now boys to educate, I should prefer those schools (other things being equal) where an opportunity was afforded for acquiring so advantageous an art, which, once learned, is never forgotten.

I know by experience, that it is a great comfort to a swimmer, who has a considerable distance to go, to turn

himself sometimes on his back, and to vary, in other respects, the means of procuring a progressive motion.

When he is seized with the cramp in the leg, the method of driving it away is, to give the parts affected a sudden, vigorous, and violent shock; which he may do in the air as he swims on his back.

During the great heat in summer there is no danger in bathing, however warm we may be, in rivers which have been thoroughly warmed by the sun. But to throw one's self into cold spring water, when the body has been heated by exercise in the sun, is an imprudence which may prove fatal. I once knew an instance of four young men, who having worked at harvest in the heat of the day, with a view of refreshing themselves, plunged into a spring of cold water: two died upon the spot, a third next morning, and the fourth recovered with great difficulty. A copious draught of cold water, in similar circumstances, is frequently attended with the same effect in North America.

The exercise of swimming is one of the most healthy and agreeable in the world. After having swum for an hour or two in the evening, one sleeps coolly the whole night, even during the most ardent heats of summer. Perhaps the pores being cleansed, the insensible perspiration increases, and occasions this coolness. It is certain that much swimming is the means of stopping a diarrhoea, and even of producing a constipation. With respect to those *who do not know* how to swim, or who are affected with *a diarrhoea at a season which does not permit them to use*

that exercise, a warm bath, by cleansing and purifying the skin, is found very salutary, and often effects a radical cure. I speak from my own experience, frequently repeated, and that of others to whom I have recommended this.

When I was a boy, I amused myself one day with flying a paper kite, and approaching the banks of a lake which was near a mile broad, I tied the string to a stake, and the kite ascended to a very considerable height above the pond, while I was swimming. In a little time, being desirous of amusing myself with my kite, and enjoying at the same time the pleasure of swimming, I returned, and loosing from the stake the string with the little stick which was fastened to it, went again into the water, where I found that, lying on my back, and holding the stick in my hand, I was drawn along the surface of the water in a very agreeable manner. Having then engaged another boy to carry my clothes round the pond, to a place which I pointed out to him, on the other side, I began to cross the pond with my kite, which carried me quite over without the least fatigue, and with the greatest pleasure imaginable. I was only obliged occasionally to halt a little in my course, and resist its progress, when it appeared, that by following too quick, I lowered the kite too much; by doing which occasionally I made it rise again. I have never since that time practised this singular mode of swimming, though I think it *not impossible* to cross in this manner *from Dover to Calais.*

RESTORATION OF THE APPARENTLY DROWNED.

THE following directions, issued by the Royal National Lifeboat Institution, cannot fail to be of great importance. They are worth the study of every boy.

Of course the first thing to be done is to send for a medical man, but meanwhile much may be done to restore breathing and warmth. The first thing is to try to restore breathing. This must be perseveringly and energetically attended to.

To RESTORE BREATHING.—*To Clear the Throat.*—1. Place the patient on the floor or ground with his face downwards, and one of his arms under the forehead, in which position all fluids will escape by the mouth, and the tongue, itself will fall forward, leaving the entrance into the windpipe free. Assist this operation by wiping and cleansing the mouth.

2. If satisfactory breathing commences, adopt the treatment described below to promote warmth and natural breathing. If there be only slight breathing or no breathing, or if it fail, then—

To Excite Breathing—3. Turn the patient well and instantly on the side, and—

4. Excite the nostrils with snuff, hartshorn, or smelling-salts, or tickle the throat with a feather, &c., if they are *at hand*. Rub the chest and face warm, and dash cold water on it.

5. If there be no success, lose not a moment, but instantly

To Imitate Breathing—6. Replace the patient on the face, raising and supporting the chest well on a folded coat or other article of dress.

7. Turn the body very gently on the side and a little beyond, and then briskly on the face, back again; repeating these measures deliberately, efficiently, and perseveringly about fifteen times in the minute, or once every four seconds, occasionally varying the side.

[By placing the patient on the chest, the weight of the body forces the air out; when turned on the side this pressure is removed, and air enters the chest.]

8. On each occasion that the body is replaced on the face, make uniform but efficient pressure, with brisk movement, on the back between and below the shoulder-blades or bones on each side, removing the pressure immediately before turning the body on the side.

[The first measure increases the expiration, the second commences inspiration.]

* * The result is—respiration or natural breathing; and if not too late—life.

CAUTIONS.—1. Be particularly careful to prevent persons crowding round the body.

2. Avoid all rough usage and turning the body on the back.

3. Under no circumstances hold the body up by the feet.

To PREVENT ANY FURTHER DIMINUTION OF WARMTH.—

N.B. These efforts must be made very cautiously, and

must not be such as to promote warmth and circulation rapidly; for if circulation is induced before breathing has been restored, the life of the patient will be endangered. No other effect, therefore, should be sought from them than the prevention of evaporation, and its result, the diminution of the warmth of the body.

1. Expose the face, neck, and chest, except in severe weather (such as heavy rain, frost, or snow).
2. Dry the face, neck, and chest, as soon as possible with handkerchiefs or anything at hand; and then dry the hands and feet.
3. As soon as a blanket or other covering can be obtained, strip the body; but if no covering can be immediately procured, take dry clothing from the bystanders, dry and reclothe the body, taking care not to interfere with the efforts to restore breathing.

- CAUTIONS.—1. Do not roll the body on casks.
2. Do not rub the body with salt or spirits.
3. Do not inject tobacco smoke or infusion of tobacco.
4. Do not place the patient in a warm bath.

TREATMENT AFTER NATURAL BREATHING HAS BEEN RESTORED.—*To promote Warmth and Circulation.*—1. Commence rubbing the limbs upwards, with firm grasping pressure and energy, using handkerchiefs, flannels, &c. (by this measure the blood is propelled along the veins towards the heart).

The friction must be continued under the blanket, or over dry clothing.

2. Promote the warmth of the body by the application of hot flannels, bottles, or bladders of hot water, heated bricks, &c., to the pit of the stomach, the armpits, between the thighs, and to the soles of the feet.
3. If the patient has been carried to a house after respiration has been restored, be careful to let the air play freely about the room.
4. On the restoration of life a teaspoonful of warm water should be given; and then if the power of swallowing have returned, small quantities of wine, warm brandy-and-water, or coffee, should be administered. The patient should be kept in bed, and a disposition to sleep encouraged.

General Observations.—The above treatment should be persevered in for several hours, as it is an erroneous opinion that persons are irrecoverable because life does not soon make its appearance, cases having been successfully treated after persevering for many hours.

Appearances which generally accompany Death.—Breathing and the heart's action cease entirely; the eyelids are generally half-closed; the pupils dilated; the jaws clinched; the fingers semi-contracted; the tongue approaches to the under edges of the lips, and these, as well as the nostrils, are covered with a frothy mucus. Coldness and pallor of surface increase.

CHAPTER V.

ANGLING.

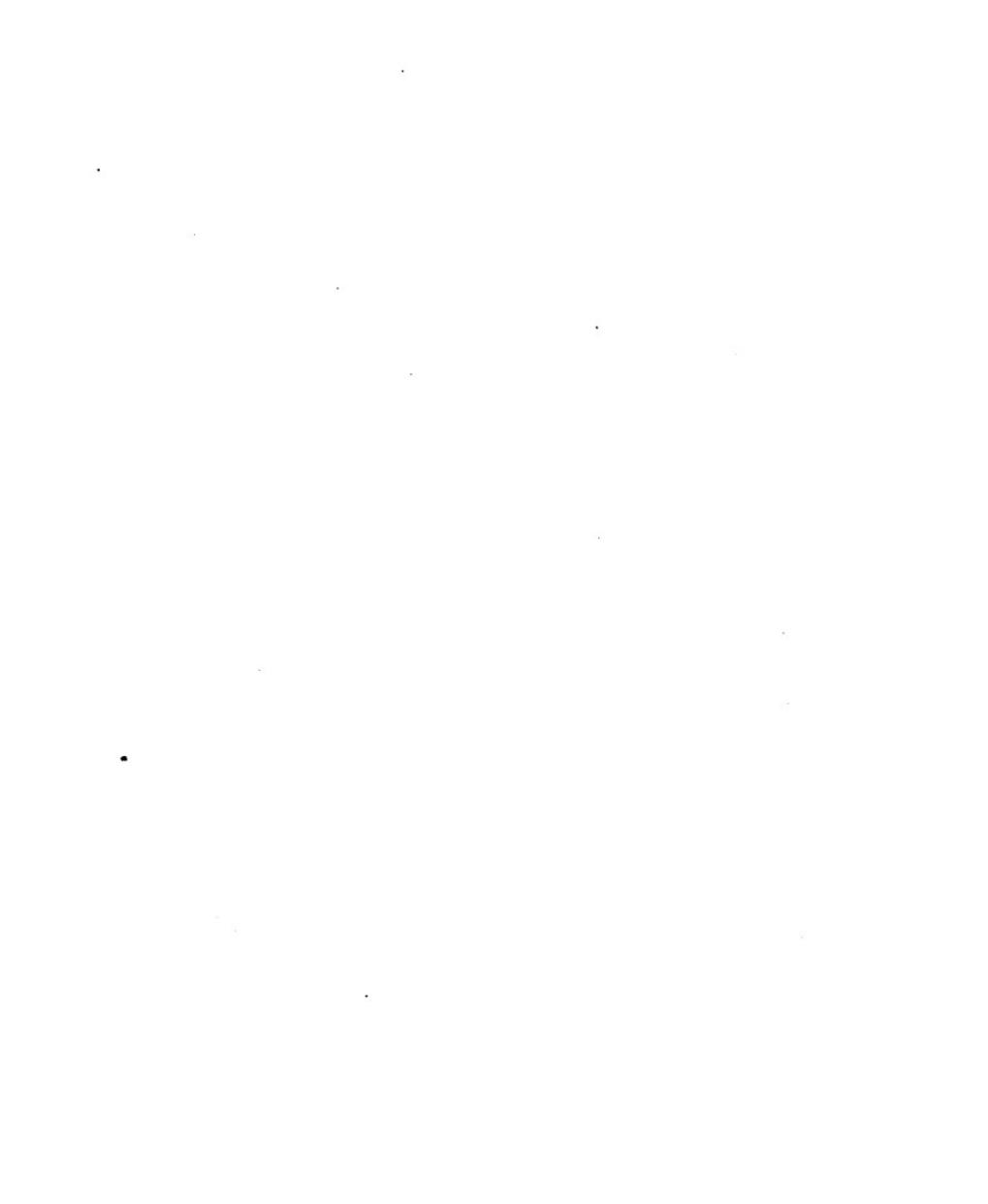


PANGBOURNE.

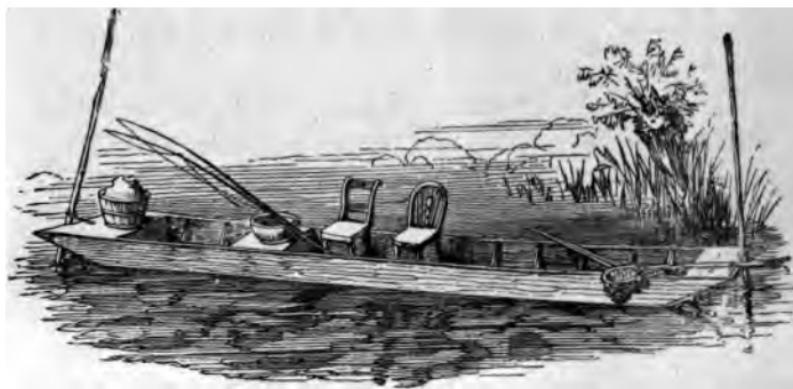
Boys need a variety of sport as well as other things, and *when* they are disinclined for the hard work of cricket, or *need a little rest* when they are stiff with a two days' match, *few things are pleasanter* than a ramble along the river.

FISHING.





side, with line in hand, for a day's fishing. To many lads the water, with its little surprises in the shape of leaping trout and rushing jack, has a charm which nothing else possesses. Though most of the unpreserved rivers are so unsparingly netted that an angler is often doomed to disappointment, yet, if he be really skilful, he will not fail to secure a fair amount of sport. With a punt in the middle



FISHING PUNT.

of the Thames, away from the steamers and sewerage, he cannot fail to take roach, perch, dace, and pike, and even trout, if he knows the right places; while there are capital opportunities for fly and bottom fishing in the various brooks and rivers through the country.

Nothing but practice will make a good angler; but we will do our best to put our young friends in possession of the *most complete information* that a book can afford.

The first thing to be attended to by the angler is the necessary apparatus, consisting of rods, lines, winches, floats, hooks, landing-net, plummets, baiting-needles, clearing-ring, split shot, two or three leger-leads, a pair of pliers for putting shot on a line, caps for floats, kettle for live bait, a pannier or basket for ground-bait, gentil-boxes, bag for worms, bank-runners, a piece of shoemaker's wax, a bit of soft leather, and a small piece of whet-stone for sharpening blunt hooks; also, a pocket-book of fishing-tackle, with a reel to hold lines.

THE ROD.—As the angle-rod is a material article in the angler's catalogue, much care should be taken to procure a good one. The fishing-tackle shops keep a great variety, made of bamboo cane, hazel, hickory, &c., and any respectable maker will supply them. Rods are of different lengths, some fitted as walking-canies, and others to pack in canvas bags: the latter are to be preferred, because you may have them of any length, and they are made more true: those made of bamboo cane are best for angling near town, having several tops of various strengths; but the rods made of the white cane are much superior for fine fishing, particularly for roach, being very light in weight, but stiff. In choosing a rod, observe that it is perfectly straight when all the joints are put together, and that it gradually tapers from the butt to the top, and is eighteen feet long. A bad rod is liable to snap in striking a heavy fish. Rods fitted with several tops, all packing together, are at once the best *and most convenient*. Some anglers have one rod for trol-

ling, another for barbel, perch, or other heavy fish, as well as those for fly-fishing, but a thoroughly good rod will suit all purposes. I have now one with which I can fish from a bleak to a pike by only changing the tops and second joints. A good trolling-rod should be made of the choicest stout and well-seasoned bamboo cane ; in length, it should not be shorter than fourteen feet, but sixteen is more desirable. When trolling with the gorge or fishing with live-bait, a long rod is necessary to enable the angler to drop in his baited hook over high sags, rushes, &c. ; as, also, if the water be bright, for he should then keep as far away from it as he possibly can, which a long rod enables him to do while dipping, casting, or spinning his bait. If either a jack or pike see him, it is very rare indeed that he will then take the bait ; and again, with a long rod you will be able to drop your baited hook in some very likely place for jack or pike, such as a small hole, division, or clear place among a bed of weeds, in a river, or any other water where there are many weeds. For fly-fishing, of course, a single flexible rod of moderate length is the best.

There is some difference of opinion among anglers about the number of rings necessary for trolling-rods : those who have their line on a thumb-winder, or on a bank-runner, seldom place more than two or three rings on their rod, and others have only one large ring at the top ; but if a winch is used, there should be a ring to every joint except the butt ; that is, fasten the winch to the butt about a foot from the bottom, and let that joint be without a ring. Let each

ring be made of double brass wire, fixed so as always to stand out, and nearly large enough to admit the top of your little finger : the top joint should have two rings, the top one nearly three times the size of the others : this prevents any obstruction to the line running, which is of material consequence.

LINES.—Fishing-lines are made of gut, twisted horse or cow hair, and single horse-hair, also of silk or mohair : those made of gut are the strongest and best (especially for young anglers), the twisted hair cheapest, and the single horse-hair the finest. Bad lines are liable to twist in the water. You may make a fine line having half single hair at bottom, the other part two hairs twisted. The gut, or silk-worm gut, is made or manufactured from the intestines or gut of the silk-worm, and is the strongest substance, for its circumference, known by the angler, and makes a line superior to anything else ; the natural colour of which is better than much that is stained. The young angler will find a line of about four yards in length the most useful, to fish either with or without a winch, as he must note that the line is unmanageable if longer than the rod. Note : in shooting the line, sink the float, and place them both together within three inches of the bottom loop of the line, to which loop fix the loop of the hair or gut that the hook is tied to. Place two small shots (the smaller the better) about two inches from the hook (which will cause the bait to swim well and steadily) and the rest above the first loop. When you place shot on the line, do it with a pair of pliers, which is the

best and easiest method ; some fasten them with their teeth, but it is a bad practice, for they often bite the hair or gut through, which causes much delay and vexation, particularly if it happens when you are fishing. When you make a line, either of silk, gut, or hair, it must always be finest at bottom where the hook is fastened, very gradually increasing in bulk or thickness to the top.

In respect to the advantage arising from angling with lines made of single horse-hair, and hooks tied to the same, over those which are made of fine gut, some difference of opinion exists among anglers. The advocates for gut say, when it is equally fine and of the same colour as horse-hair, it is not likely to alarm fish more than horse-hair, and being much stronger, it certainly deserves the preference. This seems plausible ; fish may be taken, when angling with a single hair line (especially roach), that will not touch the bait when offered with a gut line, though the line shall be as fine and of the same colour, &c., as the hair line. A single hair line, with a small porcupine float, is preferable for general fishing. The platted silk lines are the best for trolling, in every sense of the word ; they are stronger than those which are twisted. Let the twisted be made wholly of silk, or silk and hair. Platted silk lines are also less inclined to link or tangle than the twisted, which every troller knows is of some consequence.

To FASTEN THE ROD TO THE LINE.—Pass the loop of your line through *the ring at the extremity of the top joint of your rod, carry it over the ferrule end, and then draw your*

line up to the top again; the loop will then be fast, and the line will hang from the above-mentioned ring; you will then put the joints of your rod together, and the rod and line will be complete. Most experienced anglers keep about six or eight inches of fine silk line tied to the end of the top joint, and fasten the gut or hair line to the said six or eight inches of silk, by a draw loop-knot: this is an excellent method, because the ring is apt to chafe gut or hair. When you have a winch on your rod to use running-line, pass the said running-line from the winch through every ring on the rod, and pull about a yard of it through the top ring, and fasten it with a draw loop-knot to the line which has the float and hook to it. When you angle with a running-line for those fish that it is proper to strike the instant you perceive a bite, make a slip-knot in the line, and put in the said knot a bit of thin stick, quill, or tough grass, about an inch long, to prevent the line running back on the rod, which it will do, especially if the wind is any way in your front.

To TIE A HOOK.—Hold the hook between the thumb and finger of your left hand, and whip round the shank, from the bend of the hook to the top, some fine silk waxed with shoemaker's wax; then lay the hair or gut on it, and whip it over very close with the waxed silk, from the top of the shank till you come opposite the point of the hook; then draw the silk through the loop which is made by leaving it *three turns slack*, and cut off the spare silk. The knot used *in making fishing-lines* is called a water-knot, and is made

by passing the ends twice over and then drawing them tight ; this knot will never draw or slip.

FLOATS.—With regard to floats, it is of the first consequence that the angler should be acquainted with those proper for fishing in different waters, and for various kinds of fish ; as more depends upon that part of his tackle than inexperienced or superficial observers imagine. I shall, therefore, request his attention while I point out those proper for the purpose :—

THE TIP-CAPPED FLOAT.—These floats are made of several pieces of quills, or of reed for the middle, and ivory or tortoise-shell at the top and bottom, and narrow at each end, gradually increasing in bulk or circumference to the middle ; but those which are made thickest above the middle, nearest the top, swim the steadiest in blowing weather, against the stream, rough eddies, and at the tail of mills : these floats are fastened to the line with a cap at each end. Tip-capped floats are superior to every other for angling in waters which are not very rapid, particularly in roach fishing, as the least movement or fine bite sinks it below the surface of the water. The tip-capped float is also best for pond fishing for carp and tench, as it requires but few shot to sink it, and consequently disturbs the water but little when cast in ; which is of the first consideration when angling for such shy fish as carp, tench, or chub. Note : the caps which fix the lines to the float are often rough at the edge, which chafes and weakens a fine line ; therefore, make it a practice to examine and smooth them before you put them to use.

CORK FLOATS are generally made of quills at the top, with a piece of cork, which is burned or bored through the middle, to admit the quill, and then filed or ground smooth, and painted; the bottom is plugged with wood and a ring attached to let the line pass through. The cork floats are well calculated to fish in heavy and rapid streams, as they require a great many shot to sink them; which weight of shot prevents the baited hook passing too quickly over the bottom of the place where you may be fishing; for, with a strong current or stream and a light float, the baited hook goes over the place you have ground-baited, before it reaches the bottom; consequently, you lose the greatest chance of success from the float not sinking quickly. Cork floats are made of various sizes and shapes: instead of common quills, some introduce the quills of the porcupine, which make an excellent strong float. A small cork float, in my opinion, is far the best for gudgeon fishing.

PLUGGED FLOATS.—These kinds of floats are the cheapest; they are made of indifferent quills; some of them with one goose quill and a wooden plug at the bottom, from which they take their name: they are very apt to loosen by the plug coming out. These floats suit the young angler from their cheapness, and from being easily put on the line, having a cap at the top, and a ring at the bottom: however, the better-informed angler objects to the ring at bottom, because it does not keep the line close to the float, and from the resistance or hindrance it makes in passing through the water, *particularly when the fish bite fine*; therefore, he always *uses the tip-capped float in ponds or rivers, where the*

stream will admit, in preference to every other. I must, however, condemn plugged floats altogether, as bad.

To MAKE THE FLOAT STAND OR SWIM UPRIGHT IN THE WATER.

—Some shot must be put on the line, as already directed in treating of the hook ; they are kept ready split for the purpose at the tackle shops ; but a perfect angler will buy the shot for himself, and with a pair of split-shot pliers split them as he wants them : let him always prefer small shot. The float must be so shotted as to be about three parts under water, so that in light fishing the fish may have a short draw before the strike.

How to BAIT A HOOK.—To bait a hook with a worm use the following method :—First enter the point of the hook close to the top of the worm's head, and carry it carefully down to within a quarter of an inch of its tail ; to do which you must gently squeeze or work the worm up the hook with your left thumb and finger, while with your right you are gradually working the hook downwards : the small lively piece of the worm at the point of the hook moving about will entice or attract fish ; but note, if too much of the worm hangs loose, though it may entice fish to nibble, yet they will seldom take the whole in their mouth so as to enable the angler to hook them ; on the contrary, he is frequently tantalized with a bite, and when he strikes, finds part of the worm gone, the hook bared, and no fish : therefore, to bait a hook well with a worm is necessary to insure hitting a fish *when you strike* ; and it consists in drawing the worm, *without injuring it*, quite over and up the shank

of the hook, leaving only a small lively part of the tail below the point thereof. If you bait with a half or piece of worm, prefer the tail end, and enter the point of the hook into the top part of it, and bring it down nearly to the end of the tail, leaving only a very small piece loose. But if you bait with two worms on a hook, draw the first up above the shank, while you put the second on in the same manner as directed with one worm, but enter the hook near the tail of the second worm, then draw the first one down on the second over the shank of the hook, and all will then be well covered, and will be a very enticing bait for perch, carp, chub, barbel, and all large fish; but when angling for gudgeon or other small fish, half a red-worm is sufficient, and the tail end is the best. If blood-worms are used, put on two or three, in doing which be tender, or you will burst them.

WITH GENTILS.—To bait a hook with a gentil, use this method:—Enter the point of the hook into the gentil near either end, and bring it out at the other end, then draw the point back again just within the gentil enough to hide it; if you use more than one, pursue the same method. This is the best way to bait with a gentil whose skin is somewhat tough, especially in cold weather, by piercing the skin in the first instance. By striking fine (when you have a bite), your hook will enter sufficiently into the fish and secure it, and you do not risk breaking your line or the *top of the rod*, which frequently happens by striking too hard.

WITH GREAVES.—To bait a hook with greaves do as follows :—First select the whitest pieces from what you have soaked, and put four or five of them on your hook, or as much as will cover it from the bend to and over the point ; these pieces should be about half the size of a sixpence, and put on the hook separately or one after the other,—not doubling a large piece, as some indolent anglers do, for then the hook is prevented entering firmly the fish you strike ; whereas, by putting the pieces on separately, when you strike, they either break off or are pushed up the shank, and the whole bend of the hook enters the fish, and you have firm hold. These minutiae of baiting, &c., are of singular advantage, which the observing angler will not fail to attend to and appreciate. Note : it is a bad practice to boil greaves or soak them in boiling water, for it makes them rotten and they soon fall off the hook : they are longer in soaking in cold or cool water, but are then tough.

THE LANDING-HOOK AND LANDING-NET.—The landing-hook is a large hook, which is sometimes barbed like a fish-hook and sometimes plain, fastened on the end of a rod ; this rod is occasionally composed of several pieces, which run one within another like a telescope, from which the apparatus is called a telescope-handled landing-hook. A landing-net is small like a purse-net, mounted on an iron ring ; which is fastened like the landing-hook on the end of a rod or pole. Never fail to take a landing-net when you go for a day's fishing, or you will be in danger of losing your best

fish in bringing them from the surface of the water to the bank.



THE YOUNG ANGLERS.

PLUMMET.—Plummets are of two kinds, either the common plummet, or the folding plummet. The folding plummet, which is made of a slip of sheet lead rolled up, is by far the better; and, by neglecting it, many of our young anglers spoil their sport.

PLUMBING THE DEPTH is done in the following manner: —If a ring plummet, pass the hook through the end, fix the *point* into the cork at the bottom; if a folding plummet, *unfold about two inches of it*, pass the hook over its side, and

then fold the plummet up again : your hook is now secured from drawing away from the plummet : as success depends much in angling at a proper depth, take due pains, and measure the depth accordingly before you begin fishing. Note : when the plumb-lead touches the bottom, and the top of the float is even with the surface of the water, you have the true depth.

BAITING NEEDLE.—The baiting-needle is used for putting on dead baits for trolling, &c.

CLEARING-RING OR CLEARING-LINE.—The clearing-line is made of several yards of strong small cord, to the end of which is fastened a heavy ring of lead or brass ; if the hook should get fast to a heavy weed, post, or any thing else, this ring is put over the rod and suffered to go down to the hook : hold your rod in the right hand, the top pointing downwards, and the clearing-line in your left, letting the ring fall on the hook, which, from its weight, generally clears the hook from what it may have struck into ; if not, hold the rod tight, and draw the line sideways and break away. In this case, the angler seldom loses more than a hook, if he acts as above directed ; but without the assistance of a clearing-ring he frequently loses his float as well as hook and line, and sometimes breaks his top joint. The brass clearing-rings are to be preferred, because they are jointed, and in consequence can be used when the angler has a winch in his rod, in which case, the leaden ring could not be passed over the winch. These useful articles to the angler are to be met with at the fishing-tackle shops.

DRAG-HOOK.—The drag is a piece of iron with three or four stout wire hooks, without barbs, placed back to back, to which is fastened a long packthread line, that is used to draw away weeds that a heavy fish may have got himself or the line among, and also to recover any part of the tackle that may be entangled in weeds, or to take up night-lines, trimmers, &c. The landing-hook is, however, infinitely preferable, and not so troublesome. I therefore advise the angler not to use the drag-hook at all, and merely describe it that he may know the meaning of every article he may hear spoken of.

LIVE-BAIT KETTLE.—With regard to the live-bait kettle, I prefer one of a long square form to a round one, as the water is much less agitated in such a shaped kettle when you are carrying it than in a round one, and it is more convenient to carry or pack in a basket, &c., for a journey. To select my bait, instead of putting my hand among the fish, which not only frightens them, but, by heating the water, makes them sickly and dull, I make use of a very small net, not much more than half the size of those used to take gold and silver fish out of globes: this net I carry very conveniently in my fish kettle, by having a piece of the lid cut away at one corner, where a few inches of the handle of the net project. Do not forget to change the water frequently in your kettle, and if you are staying in one place for any length of time, let it down into the water attached to a stout *cord*.

INDIAN-RUBBER is of use to rub lines when they become

chafed and ragged, as it immediately makes them smooth : by rubbing gut or hair, which has lain in coils, with Indian-rubber, it will instantly become straight.

BANK RUNNER.—The bank runner is mostly used in the daytime, while the angler is fishing for roach, barbel, &c., and is stuck in the bank, the bottom being strong turned wood sharpened for the purpose, with a winder at top for the line, which should be from sixteen to twenty feet long, made of silk trolling-line, thin cord, or platted Dutch twine ; but you must have a cork and bullet to the line, and bait with a dace, which should swim a foot or two from the ground, as it will by the aid of the cork.

When you use the rod, hold the line with your left hand, and with your right pass the forked end under the line just above the bullet : you may then place the baited hook in the water where you please by a jerk of the rod ; at the same time letting the line go from the left hand.

MAN-OF-WAR TRIMMER, called also a Foxhound, is made of a large piece of flat cork about five or six inches in diameter, with a groove to admit the line, which is the same as that used for the bank runner ; it is, however, without a bullet, according to circumstances.

WINCHES.—The best winches are those to fix in a groove, and are fastened with brass ferrules, made for the purpose, on the butt ; because you can fasten such a winch to any sized joint. Be sure to choose a multiplying winch, which will be found infinitely superior to a common one. Always keep your *winch unlocked*, or purchase a winch without a

lock, which you will always find best ; because in the hurry of the moment, when you have struck a heavy fish, and the winch is locked, he generally breaks away before you can give line to prevent such an occurrence.



BAITS.

GENTILS are a capital bait for roach, particularly in the winter months, and can be had perfectly ready for use at any of the tackle shops in London, or they may be obtained by exposing sheep's liver or fat to the sun : but we would advise our young anglers not to disgust their friends with their fishing performances by any experiment with coarse bait ; they can be easily obtained at any tallow-melter's or *from the butcher's* in the summer, and they can be scoured by keeping them in moist sand or dry bran.

BRANDLINGS are found in great numbers in dunghills, particularly in those which have lain some time, and become very rotten : they are used for carp, perch, &c. This worm is striped with red and yellow across the whole body. Brandlings are more used by provincial than by the London anglers : they should be kept several days in moss, to scour out the bitter pungent mixture with which they abound. These are the best worms of all.

RED WORMS.—Some red worms are found in old dunghills, and they also breed among the bark after it has been used by tanners, and thrown out in heaps ; but the principal places where they are found are the banks of the great common sewers near the metropolis, from which places the tackle shops are chiefly supplied, as those banks close to the water breed lob, marsh, brandling, and red worms, in immense numbers. The red worm, when well scoured, is of a fine bright red colour, with a knot or belt in the middle ; it is the best and most killing worm for carp, tench, barbel, chub, perch, gudgeons, eels, flounders, bream, &c. Too much cannot be said in praise of well-scoured red worms ; two on a hook are very enticing to perch, barbel, carp, chub, tench, and even roach ; indeed, hardly any fish will refuse them, especially during the spring, autumn, and winter : in summer you may use them in the evenings of wet days, because at such times worms move, and the fish then expect them on the banks, from which they frequently drop into the water.

BLOOD-WORMS.—*This worm, or maggot—for it seems to*

be covered with a case or chrysalis, and at last becomes a gnat-fly (the smallest used in angling)—is found at the bottom of shallow ponds in cow-layers or yards, and is bred from the excrements of the cows and other horned cattle. By gathering the earth, sand, and dung from these ponds, innumerable blood-worms may be found; some are also to be met with in the ditches or drains that run from houses, farm-yards, &c., but they are not so large as those found in the cow-layers. In the ditches, drains, and sewers, the curious may find so many blood-worms, that certain parts appear a mass of blood, over which innumerable gnats are playing; they are about an inch long, and not much thicker than a worsted needle, and of a blood-red colour, from which they take their name; they generally appear in April. This worm is very lively, and a most killing bait for many fish, particularly gudgeons, carp, roach, dace, &c. Put two or three on the hook together. To preserve them alive, keep them in some earth mixed with a little damp cow, horse, or pig dung; or they may be kept in the soil you find them in when taken from the ponds.

SHRIMPS.—Live or dead shrimps are a good bait for perch, eels, ruffs or pope, and flounders. If dead, the shell or case must be taken off before you use them. When you

use shrimps for a bait, enter the point of your hook in



its side near the back, and bring it to the side of the head near the eye. During the summer months, the canal crossing the Isle of Dogs abounds with shrimps, which are easily taken with a minnow or fine landing-net. Note : when angling for perch, carp, pike, barbel, chub, roach, &c., during the months of June, July, August, and September, you must not expect them to feed in the middle of the day, say from eleven to four o'clock in the afternoon, unless the weather is very dark and gloomy. During drizzling rain or a light breeze of wind, therefore, fish early and late, or you lose your time and labour. Many a good perch have I taken in the East India Docks with a live shrimp.

WASP, GRUBS, MAGGOTS, CLAP BAITS, AND CASE WORMS, OR CAD BAIT.—The young wasp or bee, when in the state of maggot, is an excellent dapping and tripping bait for trout : this maggot is much like the common gentil, but considerably larger : use a No. 8 hook, and put a good bunch of them on at a time, and let them swim down the current, touching the bottom. There are two kinds of maggots which were used by anglers formerly, but the experienced of the present day very properly reject them. These maggots, or, as some call them, bobs, and grubs, are found when turned up by the plough, particularly in the spring, and in a sandy soil ; they are three times as big as a gentil, and have a red head : they are the grubs of insects called cockchafers.

The best time to collect a stock of worms is in March or April, for at that season they are very healthy, and may be

kept more than twelve months, by following the directions given in page 140.

I would advise the angler always to take a few red worms with him when he goes to fish, even if he intends to try for roach or any other fish; for, although paste is the proper bait for roach, yet sometimes a perch will make his appearance among the roach, which may have collected about the baited hook, and all sport will instantly cease: in that case a worm bait is the best remedy; for, on applying it, the disturber is generally soon taken.

CHICKEN'S GUTS, or those of any kind of poultry, form, when fresh, excellent bait for eels, and occasionally for jack and pike.

PASTE.—Paste is a killing bait for almost every kind of fish that breed in rivers or any fresh waters, but it requires some little time and labour to make it, and it must be done with clean hands, and requires care and skill in using it. Nothing more is wanted, in making paste to kill every kind of fish which will take paste, than flour, bread, water, and honey, with a little vermillion or red ochre to colour the paste.

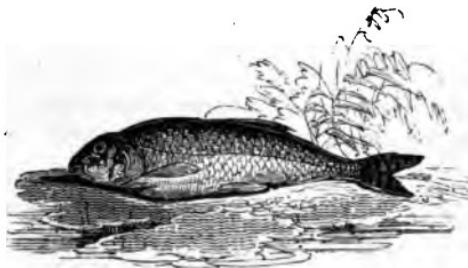
SWEET PASTE FOR CARP, TENCH, CHUB, AND ROACH.—Take the crumb of a penny roll, or a piece of loaf the same size, of the first day's baking, and dip it into honey; then work it in your hands, that the honey may be well incorporated with the bread, and until it is of a sufficient consistence to remain on the hook: this is the most killing bait for carp *I ever met* with, during the months of July and August, and the rest of the season. Tench, chub, and roach are

also very fond of it. I have taken many heavy roach with this sweet paste when they refused every other bait. The quantity I have named is enough for a day's fishing, but it is proper to take some to throw in occasionally close to your float, while angling. When honey is not to be had, dissolve a quantity of loaf-sugar in warm water, and dip the bread therein; this makes a good, clean, and sweet paste when well kneaded.

PLAIN PASTE FOR ROACH, &c.—Take a piece of the crumb of a roll or loaf the day after it is baked, about the size of an apple, and dip it lightly in water; immediately squeeze it as dry as possible, and then place it in your left hand, and with your right thumb and fingers work or knead it well until it becomes exceedingly smooth and stiff. To make this paste to the consistence I have named, it will require to be kneaded a quarter of an hour at least. This paste, when well made, is the best bait used for roach, as they will seldom refuse it at any time of the year. Carp, tench, chub, dace, bleak, barbel, and minnows, will also take it. This paste is valuable from its being easily made while you are at the water-side; indeed it is most proper to make it there, especially if you fish at any distance from home, as it may chance to get somewhat sour by carrying it a length of time; it is further valuable in striking fish when they bite; for, if made properly, it will adhere to the hook until you have struck; it then flies all to pieces, consequently your hook *is not impeded* in fixing in the fish, *which is material, particularly in angling for roach.*

In making paste it is absolutely necessary that the bread, the water, and your hands should be very clean, otherwise it will be of a bad colour and taste. In that case you must not expect success.

BOILED WHEAT is perhaps the best bait of all for roach; it is quite as killing, particularly in the autumn months, as gentils or small worms, and it is less likely to drop off the hook by the action of the water than paste. The wheat should be stewed slowly for an hour or more, until the grains have swollen to a goodly size, the skin being cracked and the grain being left hard enough to hold firmly on the hook.

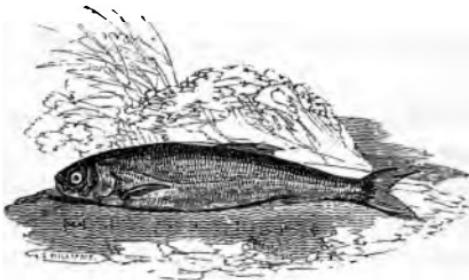


THE GUDGEON.—The Gudgeon is to be found in most of the English rivers: it delights most in gentle streams, with gravelly and sandy bottoms. Though properly a river fish, they thrive amazingly in ponds which have gravelly scours, and are fed with brooks running through them. The shape of the body is thick and round; they *have no scales*, and are somewhat of a smelt-like appearance. *This fish is leather-mouthed; the lower jaw is shorter*

than the upper; at each corner of the mouth is a single beard; the back is a dark olive, streaked with black; the lateral line straight, the sides beneath that silvery; the belly white; the tail is forked, and (as well as the dorsal fin) is beautifully marked with black. The flesh of the gudgeon is so delicious, that it is called the fresh-water smelt.

The gudgeon bites freely, from the latter end of spring until autumn commences, in gloomy warm days, from an hour after sunrise to within the same space of its setting; and during the rest of the year, in the middle of the day, when it is warmest: they do not take readily in cold weather, nor soon after spawning. In angling for this fish in the shallows, the tackle must be very fine; a single hair or fine gut line, a hook No. 8 or 9, a short rod and line, and a small porcupine float; the bait should drag on the ground. They will take the small red worm, gentils, and blood-worms; the first is perhaps the best, and a rake (or the boat-hook, if fishing from a boat) should be kept frequently stirring the bottom. To this spot they assemble in shoals, expecting food from the discolouring of the water; and by now and then throwing in a handful of gravel, mixed with dead gentils, they are also kept together, and sometimes great quantities are then taken. They are apt to nibble at the bait; the angler ought not, therefore, to strike at the first biting. Some use two or three hooks on the line, which is a bad practice; one hook is always preferable—more are likely to entangle, and make clumsy fishing.

If gudgeon are needed for bait, they must be got with a net when the water is a little muddy and rather high : a good hand, however, who knows a river can secure a supply at any time.



THE BLEAK.—Bleak are handsome fish, but do not grow to a large size, seldom exceeding two ounces in weight, and not much valued for their flavour : they are a lively, sportive fish, and easily taken with a gentil, or with a small fly at the top of the water, and paste or gentils at mid-water, but seldom at the bottom. They make lively sport on a hot sunny day, when no other fish can be caught, and may do for a pike bait when your gudgeon are all exhausted.

THE ROACH.—Roach is a handsome fish, either in, or fresh out of the water ; it inhabits many of our deep still rivers, delighting most in quiet waters, and is gregarious, keeping in large *shoals*. It has a small head, a small, round, leathery



mouth, with the teeth in the throat; large eyes, the circle of which resembles gold colour, with the iris red, particularly whilst in perfection, which may be known by the smoothness of the scales, for when out of season these feel like the rough side of an oyster-shell; the side line bends much on the middle, towards the belly, and the tail is a little forked. It is so silly a fish that it has acquired the name of the *water sheep*, in contradistinction to the carp, which for his subtlety is termed the *water fox*. The proverb of "sound as a roach," does not appear to be peculiar to this country; the French have the same idea, comparing people of strong health to their *gardon*, our roach, and yet this fish is not more distinguished for its vivacity than many others.

The roach delights in gravelly, sandy, or a kind of slimy marl bottom, under a deep, gentle, running stream: in summer they often frequent shallows near the tails of fords, lie under banks among weeds (especially when the water is thick), under the shade of boughs; and at or opposite the mouth of a rivulet, or brook that empties itself into a large river, the best roach are generally to be met with; as winter approaches, their haunt is changed to clear, deep, and still waters.

The roach spawns the latter end of May: for three weeks after spawning they are unwholesome: they recover themselves in July, and get good about Michaelmas, but are in their prime in February or March.

Earth-bobs and gentils are famous winter baits, using

boiled malt or fresh grains as ground-bait; in autumn, roach will take white paste, on a hook No. 8; in summer, snails and flies, under water, for they never rise at a fly like the dace; in April, caddis, oak-worms, and small red-worms, the latter especially in windy weather.

The season for roach-fishing in the Thames begins about the latter end of August, and continues longer than most anglers choose to brave the weather. In the summer they live on the weed, and do not quit for the deeps until it becomes putrid: this depends on the drought or wetness of the weather, much rain hastening its rotting: the fishermen all along the river are at this time upon the watch, and the instant the roach move, sweep them away with their drag-nets; it requires, therefore, skill in the angler to attend to this critical period, or the objects of his diversion are by wholesale carried to market.

The tackle for roach must be fine and strong; rod not exceeding six feet, a line somewhat shorter, a porcupine float, and hooks, No. 11 or 12 (although, if not made of stouter wire than those usually sold of those sizes, No. 9 or 10; roach rarely break the hook in the water, yet the beard of these very fine hooks is frequently broken at the time of being extracted by the fish springing about, and their mouths being so bony); the baits:—gentils, red paste, boiled wheat or malt: the gentils of a pale red colour, with a white one, are often taken both by roach and dace with great eagerness; red paste is also excellent. (The angler is cautioned to be provided with several sorts of baits, as

these fish are capricious in their feeding, and in the course of a morn or eve, will shun what they had just before taken, and, in a short time, again with avidity seize that, rejecting all others.) Great attention must be paid to strike quick. In using boiled malt or wheat, select those corns that are soft and plump; one is sufficient: put the hook into it so that the point may lie where it is burst and the white appears; the fish will be more readily hooked. The ground-bait should be boiled malt, with which some holes may be previously baited; if that mode is not adopted, whilst fishing throw it in, from time to time, sparingly, or some bran mixed with clay, and put a few dead gentils with it; throw it a little above your swim; let the ground bait be made up into small balls.

The following directions must be carefully attended to by the roach angler, or he will assuredly miss his sport, as no fishing wants greater attention to details, and none will pay better for it:—A rod, rather stiff, which will strike true, and in length proportioned to the place where used; the line, a foot shorter than the rod, strong at top and tapering to the bottom, which must be fine, smooth, silk-worm gut, dyed brownish, or of a water colour; the hook No. 8; one small shot is to be put on the line about six inches from the hook, the rest close together, four or five inches higher up, sufficient to sink a swan-quill or porcupine float so that its top may just be discerned above the surface. Fish as near to the middle of the river or stream as possible if you want large fish, or many of them, and

choose a spot shaded at the side by willows or other trees, taking care to have an open gap free from boughs. If you can get a boat or punt and anchor in the middle, so much



ABINGDON CHURCH.

the better ; and, indeed, in broad rivers, such as the Thames or Severn, you cannot fish without it. If you have not a boat your rod must be of sufficient length to reach as near the middle of the stream as possible. When the spot is fixed on, plumb the depth, and the float is to carry the bait not more than one inch from the bottom, which must be level, the run gentle, and the water deep when clear, or in winter ; at other times, when the water is coloured with rain, and especially if in the rain, the bait should swim from about three-quarters of a yard to the depth of a yard and a half : if in a tide, or where streams rise or fall, the *depth*, by means of the plummet, is to be ascertained and

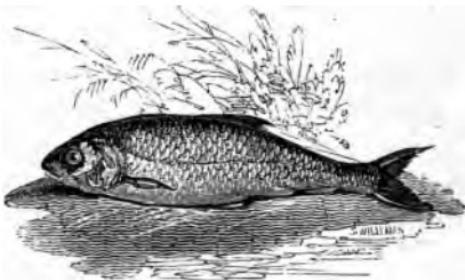
observed as above directed. If the bottom rises one way in your swim, it is better it should be as the stream runs, so that your ground-bait may not be carried into deeper water and draw the fish beyond your bait.

A sharp eye must be kept on the float, and if it is drawn under water ever so little, strike gently, yet decidedly, *as it descends*. If a full-sized roach is hooked, he should be played, for they struggle much; and, although many accustom themselves to a single hair line, yet, where the fish run large, it is not always to be depended upon. A landing net is useful in getting out the big ones, and by drawing them two or three yards below where the ground-bait lies there will be less disturbance to the fish beneath. Use ground-bait freely while fishing; grains will do, or, better still, balls made of bread worked into paste with bran, weighted with wet clay kneaded well in. These balls will break gradually at the bottom of the stream and prove very attractive to the fish.

Roach are also to be caught in warm weather with caddis and natural flies under water; and they will sometimes, in warm close evenings, a little before sunset, take an artificial fly at top, but then a well-scoured gentil must be placed at the end of the fly. In mild cloudy weather the roach will bite all day; in hot, morning and evening; and in cold, the middle and warmest parts of it.

In roach-fishing great care should be taken in kneading up your pastes, that *your hands be perfectly clean; for should you discolour your bait, you will have no sport.*

THE DACE.—Dace, or Dare, is gregarious, is a great breeder, very lively, and during summer is fond of playing near the surface. Its head is small, the irides of a pale yellow, the body long and slender; its scales are smaller than those of the roach, and it is upon the whole a



handsomer fish: the back is variegated with a dusky hue, and a cast of yellowish green; the sides and belly silvery; the ventral, anal, and caudal fins are sometimes of a pale red hue; the tail is very much forked. The dace is seldom above ten inches long; according to Linnæus, it grows to a foot and a half in length.

The haunts of dace are deep water near piles of bridges, where the stream is gentle, over gravelly, sandy, and clayey bottoms; deep holes that are shaded, water-lily leaves, and under the foam caused by an eddy; in the warm months they are to be found in shoals on the shallows near to streams. Dace spawn in March, and are in season about three weeks after; they improve and are good about *Michaelmas*, but are best in February.

This is a fish affording great sport to the angler ; indeed, more pleasure than profit, for the flesh is insipid, and full of bones. The baits for dace are the red-worm, brandling, gilt-tail, cow-dung, and earth-bob, and indeed any worm bred on trees or bushes, that is not too big for his mouth, and almost every kind of fly and caterpillar. Use flesh-flies for the surface, with the hook put into the back between the wings, the line from the middle downwards of single hairs, and a trifle longer than the rod, which ought to be eighteen feet at least, and as light as possible ; the flies can be kept in a phial ; fix three very small hooks upon single hair links, not above four inches long to the line, and in a summer's evening, at the smoothest part of the end of a mill-stream, from seven or eight, and so long as light continues, the dace will yield diversion. In the same manner, they will rise in the morning at the ant-fly, if used at the foot of a current or mill-stream, or on a scour before the sun comes on the water.

After rains, when the river is nearly level with its banks, use the caterpillar fly or a small red palmer and a yellow gentil (the yellower the better) ; run the hook through its skin, and draw it up to the tail of the fly, then whip on the surface, and the dace will rise freely.

Another way to take this fish from the middle of April until the beginning of October, is by artificial fly-fishing with a long line, the fly generally either black, brown, or red, made very small, on a hook No. 8 or 9. The three may be on the line together, about a yard asunder, letting

the black one be the lower fly, and that alone have a gentil at the end of it, and the other two be the drop flies : by this mode many dozens may be taken in the course of a morning or afternoon, when they are on the fords, and the weather is favourable, particularly in rivers where the tide flows a moderate height (as, for instance, in the Thames, between Kew and Richmond bridges), for every tide is a



RICHMOND HILL.

kind of fresh water to the fish, and, as it clears off, they *will take* astonishingly. The chief biting times are, in hot *weather*, early or late ; in cold, the middle ; and in mild

cloudy weather, the whole of the day ; but after a hot, bright sun, they will take the above flies in the clearest water, from a little before sunset until dark. Above Richmond, when the weeds begin to rot, a grasshopper with the first joint of his legs pinched off, and the hook put in at the head and brought out at the tail, and used as an artificial fly, does great execution in a warm day upon the shallows : this fishing can only be done in a boat, which is to drive down with the current (having a heavy stone, by way of anchor, fastened to a rope five or six yards long, at the head of the punt or wherry) : when the angler comes to a likely spot, he must drop the stone, and standing in the stern, throw right down the stream, and then to the right and left ; after trying about a quarter of an hour in a place, weigh anchor, and proceed in the same manner at the next probable haunt : use a common fly-line, about ten yards long, and a strong single hair next the hook. It may be said there is less certainty of catching dace in this way, than with a float and ground-bait ; but to those who are situated near the banks of the Thames, between Windsor and Isleworth, so as to take advantage of a still, warm, gloomy day, it will afford much more amusement than the ordinary method.

In angling for dace with maggots, the tackle cannot be too fine, the float small, the hook No. 9, the shot a foot from it : by baiting the place with a few maggots before fishing, the diversion will be increased. If using gentils in an eddy between two mill-streams, and the water is only two or three feet deep, *there will be greater chance of success*

than where it is deeper : use here a cork float, bait with three large gentils, and strike at the first nibble ; if there are large dace in the mill-pool, they will resort to this eddy.

In bottom fishing for dace, let the ground-bait be bread, soaked an hour in water ; put an equal quantity of bran, knead it to a tough consistence, [and make it into balls, with a small pebble in the middle to sink them ; throw these balls a little up the stream from the spot where it is proposed to angle, that the current may not drive them beyond the reach of the line. Fish for dace within three inches of the ground, especially where the ant-fly is the bait under water. The compiler has caught dace of upwards of a pound weight, upon night lines, baited with minnow for eels.

In the Mersey, near Warrington, a fish called the *grain-ing* is taken, which much resembles the dace, but is more slender, and has a straighter back ; the usual length does not exceed eight inches. The colour of the back is silvery, with a bluish cast ; the eyes, and the ventral and anal fins, are paler than those of the dace ; but the pectoral fin is redder, and they are much better eating.

THE GRAYLING.—The haunts of the grayling are in rapid and clear streams, particularly such as flow through mountainous countries. They are to be found in those of Yorkshire, Shropshire, and Salisbury, in Italy and Switzerland, and in most trout streams. They are usually taken with the same *bait* and after the same manner as trout. The grayling

is a fish of elegant form ; the body is not so deep as that of the trout ; the head small, with protuberant eyes, the irides silvery and speckled with yellow ; the mouth of middle size, and the upper jaw the largest. The teeth are very minute, seated in the jaws and roof of the mouth, and feel like a fine file ; the head is dusky, the covers of the gills glossy green, but when in prime perfection these parts are blackish. The back is of a dusky green, in-



clining to blue ; the sides of a fine silvery grey (from which the fish derives its name), marked with black spots, irregularly placed ; and when first taken, it seems to glitter with spangles of gold. The side line is nearly straight, the scales are large, and the lower edges dusky ; the large dorsal fin is spotted, the other fins being quite plain. The grayling is rather hogbacked, and from the nose and belly touching the ground together, is supposed to feed mostly at the bottom. In length it seldom exceeds sixteen inches, but one was caught near Shrewsbury that weighed five pounds.

Graylings are in season from September till January, and cannot be dressed too soon after they are caught. They lurk close all the winter, and begin to be active and to

spawn in April or early in May; at which time, and during the summer they are to be taken near the sides and at the tails of sharp streams with any of the trout flies. They rise more boldly than the trout, and if missed several times, will still pursue the bait. I have known them to rise upwards of twenty times at the fly, yet, notwithstanding they are so sportive after the fly, they are an inanimate fish when hooked, and the sides of the mouth are so tender that, unless great care be taken, the hold will be frequently broken and you lose your fish. In September they retire in shoals to the lower ends of still holes, just where the water becomes shallow, where they will take the fly at the top, which should be small: the camlet-fly is the best, and the hook No. 7 or 8.

When the water is not proper for flies, and you wish to angle for the grayling below the surface, use gentils (which they will eagerly bite at), wasp-grubs, or scoured worms, as near the ground as possible. The cad-bait and other small insects, which hide themselves in husks, they will greedily feed on; and they have often been observed rooting up the gravel and catching at everything of the kind.

Graylings will bite during the whole of cool and cloudy days, but the preferable times in spring and summer are from eight in the morning until twelve, and from four in the afternoon until after sunset; from September to January, in the middle of the day.

THE TROUT.—Trout are usually taken with a worm or a *minnow* or with a fly, either natural or artificial. Of the

worms there are many sorts—the earth-worm, the dug-worm, &c., but the dew-worm or lob-worm and the large brandling are the chief; the lob-worm for the large trout and the brandling for the lesser. There is also a species of



lob-worm, which some call the squirrel tails; a worm that has a red head, a streak down the back, and a broad tail, which are noted to be the best, because they are the toughest, most lively, and live longest in the water: for, as my readers doubtlessly know, a dead worm is but a sorry bait compared to a lively quick-stirring one. There are many other kinds of worms, such as the marsh-worm, tag-fair, flag-worm, dock-worm, &c., but whatever worms you use let them be well scoured, *i.e.*, kept long previous to using. You may cleanse or scour them quickly by placing them all night in water, if they be lob-worms, then put them into your bag with fennel, but do not put your brandling above one hour in the water. If you have time, and wish to keep them long, they will be best preserved in an earthen jar, with a good quantity of moss, which must be replenished every three days in summer time, and in winter every eight days, or the moss taken from them and clean washed and wrung dry between your hands.

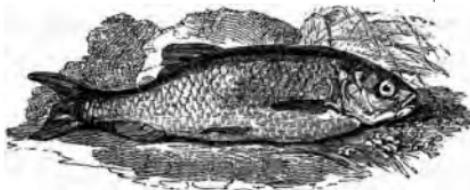
If the brandlings should be sick or flabby, to recover them put a little milk or cream by drops on the moss, about a tea-spoonful a day, and they will then soon again resume their original appearance. In fishing for trout with a worm, it is best not to have any float, but to let the line lie at the bottom as for eels. If a float is used it must be a very light one, as the trout will run with the bait, and the weight of a float dragging under water will frequently make him drop his bait. If, however, the stream be rapid and shallow, let your bait flow with the stream, occasionally drawing it against it. Do not strike until the fish has had time to gorge the bait, but let the line off the reel quickly, and let him go whither he will. A trout or jack takes a bait in his mouth as a cat does a mouse, not attempting to eat it until she gets into some corner. If, therefore, you strike too soon, you will only pull it out of the mouth. The following is a very killing method for taking large trout :—Make a pair of wings of the feather of a land-rail, and point your hook with one or more caddises ; your hook should be bristled, that is, when you whip on your hook, fasten a hog's bristle under the silk, with the end standing out about a straw's breadth at the head of the hook from under the silk, and pointing towards the line, by which means the head of the caddis will be kept close to the wings. Angle with a rod about five yards long, and a line about three ; cast the wings and caddis up the stream, *which will drive it down under the water towards the lower part of the hole* ; then draw it up the stream very

gently, though irregularly, at the same time shaking your rod, and in a few casts you will be sure to hook your fish if there is one in the hole. You may angle the same way with two brandlings. If you use two caddises with the wings, run your hook in at the head and out of the neck of the first, and quite through the other from the head to the tail.

Trout may also be taken by a minnow or gudgeon, or by a spoon-bait; the latter, though very killing for small trout, will seldom secure a large one.

Trout-fishing is practised at night as well as day; and the night is the best, for trouts will then more freely leave their holes to feed. The manner of taking them is on the top of the water, with a great lob or garden worm, or rather say two, which you must fish with in a place where the waters run somewhat quietly; for in a stream the bait will not be so well discerned. If you can place yourself in a quiet or dead place over a hole, near to some swift current, draw your bait over the top of the water to and fro, and if there be a good trout in the hole he will be sure to take it, especially if the night be dark; for then he is boldest, and lies near the top of the water on the feed, watching the motion of any frog, mouse, or water-rat that may swim between him and the sky; for these he will hunt after. If the angler should see the water but wrinkle or move in one of these dead holes, where the greatest trouts usually lie near to their holds, *he must be on the alert*; for you must note, *that the large trout is both subtle and fearful*. He lies in

his hole as close in the day as the timorous hare does in her form. The chief feeding is seldom in the day, but usually at night, and the large trout feed boldly.



THE CHUB.—This fish takes its name from the head, not only in our own, but other languages; he much resembles the carp, but is of a longer form; the body is oblong, rather round, and of a pretty equal thickness in the greater part of the slope; the scales are large, the irides silvery; the cheeks of the same colour; the head and back of a deep dusky green; the sides silvery, but in the summer yellow; the belly white; the pectoral fins of a pale yellow; the ventral and anal fins red; the tail forked, of a brownish hue, but tinged with blue at the end: he is altogether a handsome fish, and will sometimes weigh upwards of five pounds. The flesh of the chub is not in much esteem, and when out of season full of small hairy bones; but the roe is exceedingly good, and this fish, stewed as carp, will, it is said, deceive an epicure.

The haunts of the chub are in rivers the bottoms of which are of sand or clay, or which flow over a rocky bottom, in deep holes, under hollow banks, in summer particularly,

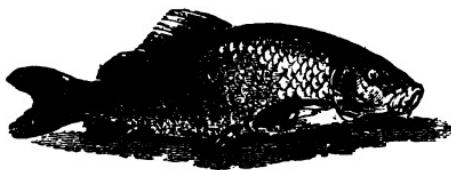
where, shaded by trees, weeds, &c., they frequently float on the surface, and are sometimes found in streams and deep waters where the currents are strong: in ponds, fed by a rivulet, they grow to a large size.

The chub does not afford the angler so much diversion as the trout, from being so dull a fish on the hook, and when once struck becoming soon tired; but he bites so eagerly, that when he takes the bait, his jaws are heard to chop like those of the dog, and having a very wide leather mouth, and his teeth in his throat, there is little danger of his breaking his hold. To fish for him, the angler should have a stout long rod, a strong line (if he uses a reel he will be enabled the better to fish under bushes) with a yard or more of the best silkworm gut at bottom, a hook proportioned to the bait used, a swan-quill float, and the line so shotted, eight or ten inches from the hook, as to sink the float to a quarter of an inch above the surface; the same ground-bait is to be used as for the carp, and the hook baited with a sufficient quantity of salmon's roe (boiled a little) to fill the bend properly: this, rightly managed, is a tempting bait. The large ones are to be caught by dibbing, very early in a morning, with the brown beetle, or cockchafer: by daybreak the angler should be at the river; and after baiting his hook, standing if he can behind the trunk of a tree, for the chub is very shy, let him move it two or three times near the surface, as in the act of flying; then let it drop on the water, shaking the rod gently, which will cause the appearance of its struggling to escape:

this attracts the chub, which are so fond of this bait, that they will rise two or three at a time to seize it: the landing-net in this fishing should never be forgotten, as the places most likely for success in taking the chub are those where the angler cannot get to the water-side to land them with his hands.

The chub will take a grub, gentils that are green, wasps' maggots (which must be baked in an oven before being used), paste of fine new white bread (without being made wet), worked up in the hand, and tinged with vermillion, as near as possible to the colour of salmon's roe: this paste will not easily wash off from the hook, and is a most killing bait; but the best baits for *bottom* or *float* fishing for the chub, are old Cheshire cheese, worked with the crumb of a new roll (such as without crumbling will mould in the hand), or the pith from the backbone of an ox, with the outward skin so carefully taken off as not to bruise the inward one. At every season of the year the former of these is good; but the latter end of summer, and all the winter, are the preferable times for both. In baiting with the cheese, put a round lump, the size of a cherry, on a large hook, so as to cover the bend and some way up the shank: fish six inches from the bottom, or in cold raw weather the bait may lie on the ground; but if the hole has not been ground-baited, the depth is immaterial. In the spring of the year, the chub will take a marsh, or small *red worm*; in May, June, and July, flies, beetles, snails (*the black ones* with the belly slit, to show the white); in

August, pastes. The large chub will also take minnows, small dace, and gudgeons, angled with in the same manner as for perch ; and the latter bait used likewise as in trolling for pike, the hook not so heavily leaded upon the shank : they gorge immediately upon taking the bait : their biting times are chiefly from before sunrise until nine in the morning, and from four until after sunset in the summer (some will by chance take at any time of the day, when mild and cloudy) ; and in winter the middle of the day is best ; remembering that in hot weather they are to be fished for at or near the top, and not deeper than mid-water ; and in cold, close to, or upon the bottom ; and that the main point in taking this fish is for the angler to keep himself out of sight.



THE CARP.—Carp are esteemed among the richest fresh-water fish we have in the kingdom : they are the principal stock of park canals and manor ponds, to the owners of which they afford considerable profit ; particularly near populous cities, where they can be disposed of to advantage at the season when such ponds are drawn, and new stocked with stores. Much success depends upon the *nature of the soil where the pond is situate* : if in a soft

marly kind of earth, or warm clay, impregnated with hazel earth, and a muddy bottom, they thrive beyond calculation; but, upon a dead, black, moory gravel, or a flinty, chalky bottom, they are sterile beyond description both in growth and propagation. They are a fish so exceedingly shy, or so cunning (especially river carp), that they afford very little success to the angler, who ought to be one of the most patient adventurers that ever embarked in aquatic sporting. They are but little found in running streams or rivers, notwithstanding very large quantities of small store are constantly thrown in from the reservoirs and breeding-ponds of gentlemen living in the vicinity of such rivers, not more to get rid of their own superflux, than to promote a friendly supply for the accommodation of their neighbours.

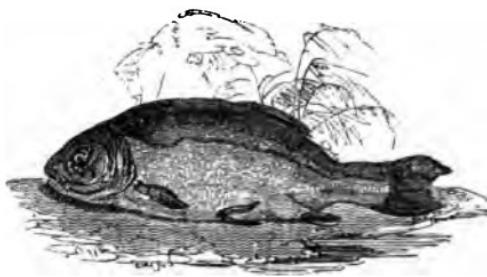
Angling for carp must be pursued either early or late in the day, and in hot weather, for he will not bite in cold.

The bait may be either worms or paste: of worms, the bluish marsh or meadow is best, but a red worm, not too big, will do, or a green gentil; of pastes, the best is made of bread and honey or sugar, for it is with sweets the angler will the more easily beguile this crafty fish, and should be thrown into the pond or stream some hours before you commence fishing, to draw them to the spot selected for angling. In a large pond, to draw them together, throw *in either grains, or blood mixed with cowdung, or bran, or garbage, as chicken-guts;* follow this with some of the

small sweet balls you intend angling with ; but be careful not to give them too freely.

To make the paste stick to your hook, add a little fine wool ; work that and the paste together with your hands, not too hard, but just sufficiently to make it tough enough to hang upon your hook. Your hands must be perfectly clean. Either white or yellowish wool will do.

If you fish for a carp with gentils, put on your hook a small piece of scarlet cloth, soaked with oil of peter, by some called oil of the rock, and keep your gentils for two or three days in a box anointed with honey ; and while you are fishing, chew a little bread, and throw in about the place where your float swims. In this way, with due patience, you may prove a match for this crafty fish. There are many other baits, but this you will find far the most killing, though the crumb of white bait and honey made into paste is excellent.



THE TENCH.—*The tench is called the physician of the fishes, of the pike or jack especially, for it is generally be-*

lieved that the pike, when hurt or sick, is cured by the touch of the tench ; certain it is that the pike will not devour him, though ever so ravenously hungry. However, without vouching for the virtue of its slime upon the inhabitants of the water, its flesh is undoubtedly a delicious and wholesome food to those of the earth. The tench does not commonly exceed four or five pounds in weight ; it is thick in proportion to the length ; the scales are very small, smooth, and covered with slime ; the eyes are large, with a red circle round them, and of a gold colour ; the irides are red ; he is leather-mouthed, and there is a small barb at each corner of the mouth, and in the head there are two small stones which some foreign physicians make great use of ; the colour of the back is dusky, the dorsal and ventral fins of the same hue, and those of the male much bigger than those of the female ; the head, sides, and belly of a greenish cast, most beautifully mixed with gold (especially those taken in rivers), which is in its greatest splendour when the fish is most in season : the tail is quite even at the end, and very broad when extended.

Tench love still, foul waters, and their haunts in rivers are chiefly among weeds, and in places well shaded with bushes or rushes ; but they thrive best in standing waters, where they lie under the weeds, near sluices, and at pond-heads. They are much more numerous in pools and pits than in rivers, although those taken in the latter are far preferable ; they begin to spawn in June, and may be *found spawning* in some waters till September ; their best *season is from that period until the end of May.*

To fish for tench, make up some paste of brown bread and honey, and you may use a marsh-worm, but he will take the paste in preference, especially if you add to it a little tar. He will also take a small red-worm, the head nipped off, and a cod-worm put on the hook first; but he will only feed in the three hot months. He will likewise bite at a lob-worm, or a green gentil; but the pastes are by far the most killing baits.

THE PERCH.—Perch have one peculiarity, contrary to the nature of all other fish of prey in fresh water (and they are so voracious as to attack their own kind), that they are gregarious, swimming in shoals. The body of the perch is deep, the scales very rough, the back much arched, and the side-line approaches near to it; the irides are golden; the teeth small, disposed in the jaws and on the roof of the mouth, which is large; the edges of the covers of the gills serrated; on the lower end of the largest is a sharp spine; and the head is said to consist of no fewer than eighty bones. The colours of the perch are beautiful, the back and part of the sides being of a deep green, marked with broad black bars pointing downwards; the belly is white, tinged with red; the ventral fins are of a rich scarlet; the anal fins and tail (which is a little forked) are of the same colour, but rather paler.

Perch are found as well in clear, swift rivers, with pebbly,



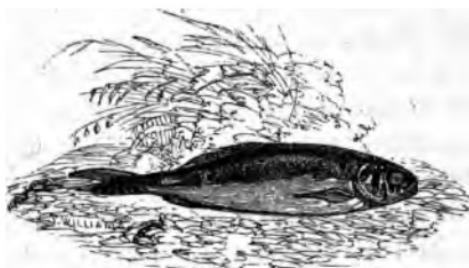
gravelly bottoms, as in those of sandy and clayey soils. They are fond of water moderately deep, and frequent holes by the sides of, or near to, gentle streams, where there is an eddy ; also in the hollows under banks, among weeds and roots of trees, piles of bridges, or in ditches and the back streams, that have communication with the large river. Perch thrive well in ponds which are fed by a brook or rivulet ; their haunts there are chiefly in deep holes, between weeds or stumps of trees, or on gravelly scours.

The perch affords the angler great diversion, and not only are the baits various, but the modes of using them. Of worms, the best kinds are small lob-worms which have no knot, brandlings, red dung-hills, or those found in rotten tan, all well scoured ; the hook may be varied from No. 2 to No. 6, being well whipped to a strong silk-worm gut, with a shot or two a foot from it. Put the point of the hook in at the head of the worm, out again a little lower than the middle, pushing it above the shank of the hook upon the gut ; take a smaller one, beginning the same way, and bring its head up to the middle of the shank only ; then draw the first worm down to the head of the latter, so that the tails may hang one above the other, keeping the point of the hook well covered. This is the most enticing method that can be adopted in worm-fishing. Use a small cork float, to keep the bait at six or twelve inches from the bottom, or sometimes about mid-water : in angling near the bottom, raise the bait very frequently from thence *almost to the surface*, letting it gradually fall again.

Should a good shoal be met with, they are so greedy that they may be all caught, unless one escapes that has felt the hook; then all is over, the fish that has been hooked becomes restless, and soon occasions the whole shoal to leave the place. Two or three rods may be employed, as they require time sufficient to gorge, to allow the angler to be prepared to strike them. To draw these fish together, three or four balls of stiff clay should be procured, and holes made in them; one end of a lob-worm should be put in each hole, and the clay closed fast upon them; and these (a yard or two distant from each other) should be thrown into the water where it is proposed to angle: the worms being alive in the balls, by their moving or twisting about, tempt the fish to feed upon them; but the angler's worms being of a superior kind, they will, on sight of them, leave those on the clay, and seize with eagerness the others. Not perch only, but many sorts of fish, are collected by this ground-bait. In the same way, with complete success, at times the gentil and other baits may be tried.

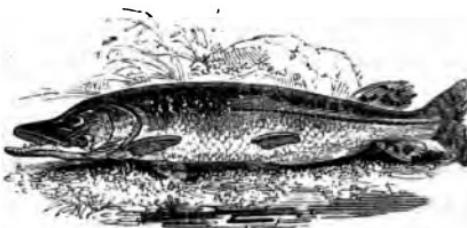
In a bad day, when the perch will not thus be brought on feed, take off the float, and extend the line as long as the rod will throw the bait out (which should be worms) without injuring it; cast it in all directions, sometimes across, at others up or down the water, drawing the bait towards you, and playing with a similar motion as in spinning a minnow: try not long in one spot. When a fish bites, slacken the line, and give time before striking: this often succeeds in bad weather, when all other methods

fail, but more especially in a rough southerly or westerly wind.



By far the best bait for a perch is a live minnow, or a small gudgeon; but the minnow is the best from its liveliness. The "Paternoster" is by far the best line for live bait fishing. They can be had at any of the tackle shops. They are made of about a yard of gut, with a small plummet at the bottom to sink them to the requisite depth. Two small lines of gut, about six inches long with the hook and bait, are attached to the main line of gut at different lengths, and fastened to a bone or metal tube, through which the line passes, so that the minnow swims round and round the line, which is held taut by the weight below. The tube is kept in its place by two or three shots above and below it on the line. The lowest of the small hook lines ought to be about six inches from the plummet, and the other about one foot above that, so that if the perch are moving in mid-water *after* prey you may take them; most will, however, be caught on the lowest bait.

Although generally termed a bold biter, the perch is extremely abstemious in winter, 'scarcely ever biting at that season, unless in the middle of a warm sunshiny day : he bites best in the latter part of the spring, from seven till eleven in the forenoon, and from two till six in the afternoon, except in hot and bright weather, and then from sunrise till six in the morning, and in the evening from six till sunset. If a day be cool and cloudy, with a ruffling south wind, perch will bite during the whole of it. In clear water, sometimes a dozen or more of perch have been observed in a deep hole, sheltered by trees or bushes; by using fine tackle and a well-scoured worm, the angler may see them strive which shall first seize it, until the whole shoal have been caught. Perch may be angled for and taken until the end of September, and indeed, at particular times, all the year round ; but the preferable season is from the beginning of May till the middle of July.



THE PIKE.—There is scarcely any fish of its size in the world that in voracity can equal the pike. One of them has been known to choke itself in attempting to swallow

another of its own species that proved too large for its swallow.

Pike spawn in March or April. When they are in high season their colours are very fine, being green, spotted with bright yellow, and having the gills of a most vivid red. When out of season, the green changes to grey, and the yellow spots become pale. The teeth are very sharp, and are disposed in the upper jaw, on both sides of the lower, on the roof of the mouth, and often on the tongue. They are altogether solitary fish, never congregating like some of the other tribes.

Small fish show a similar uneasiness at the presence of the pike to that of little birds at the sight of the hawk or owl; and when they lie sleeping near the surface (as they frequently do in sultry weather) the lesser fish swim about in vast numbers, and with evident anxiety. Pike are often taken in the hottest part of the days in summer, while they are thus asleep, by a noose of wire, fixed to a strong pole about four yards long; by which the wire with great slowness is conducted over the pike's head and gill-fins, and then hoisted with a jerk to land.

Pike are in season from May till February (the female fish are to be preferred), are bold biters, afford the angler good sport, and may be fished for all the year; but the best months (especially for trolling) are February, before the weeds shoot, and October, when they are rotted: the latter *is to be preferred*, as the pike fattened by their feed during *the summer* are then in the best condition for the table,

while, from the lowness of the waters, their harbours are easily discovered.

For trolling, the rod should be twelve or fourteen feet long ; but a strong top for this fishing, with a ring at the end for the line to run through, may be fitted to a fly or general rod. There should be one ring upon each joint to conduct the line, which is better than a greater number ; and these rings must be set on straight, that it may run freely, and not be liable to sudden check after the bait is taken, which would prevent the pike from gorging it. The line should be of silk, with a swivel at the end to receive the armed wire or gimp, at least thirty yards long, wound upon a winch or reel, fixed to the butt-end of the rod.

Hooks for trolling, called dead gorges, and other sorts for trolling, snap, and trimmer, and fishing needles, are to be bought at every shop where fishing-tackle is sold. In the choice of the first, let them not be too large, nor should their temper be injured by the lead on the shanks, or the points stand too proud ; and, although usually sold on wire, it is recommended to cut off the wire about an inch from the lead, and with double silk, well waxed, fasten about a foot of good gimp to the wire, with a noose at the other end of the gimp, large enough to admit the bait to pass through, to hang it upon the line.

The best baits are gudgeons or dace, of a middling size. Put the baiting-needle in at the mouth, and out at the middle of the tail, drawing the gimp and hook after it, *fixing the point of the hook near the eye of the fish* ; tie

the tail to the gimp, which will not only keep it in a proper position, but will also prevent the tail from catching against weeds and roots in the water. Thus baited, the hook is to be fastened to the line, and dropped gently in the water, near the sides of the river, across the water, or where it is likely pike resort : keep the bait in constant motion, sometimes letting it sink near the bottom, and gradually raising it : the angler need not make more than two or three trials in a place, for if a pike be there, he will within that time bite, if he means to do so. When the bait is taken, if at a depth too great to see, it will easily be ascertained by the line being drawn tight, and by some resistance. Let the pike have what line he chooses ; it will be soon known when he has reached his harbour by his not drawing more : allow him from five to ten minutes for his gorging the bait : wind up the line gently until the pike is seen, which he will permit, though he has not gorged. Should the bait be across his mouth, give more time ; but if he has swallowed it, manage him with a gentle hand, keeping him, however, from roots and stumps, which he will try to fasten the line upon. In clear water, veer out line until he is sufficiently tired, and a landing-net can be used ; but by no means, however apparently exhausted, attempt to lift him out with the rod and line only : for the moment he quits the water he will open his mouth, his own weight will be almost sure to tear the hook from his stomach, and the fish will thus be *lost to the angler*, although it must inevitably perish.

In trolling, the bait should never be thrown too far : in

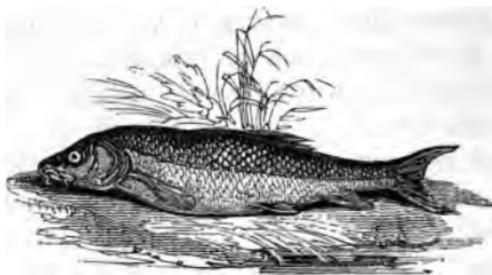
small rivers the opposite bank may be fished with ease; though the violence of its fall upon the water, in extensive throws, soon spoils the bait, by rubbing off its scales, and alarms the pike, instead of enticing him.

The bead hook is used by putting the bead into the mouth of the live bait and sewing it up; the fish will live some time, and, notwithstanding the bead, will swim with the support he receives from the line with nearly the same ease as if at liberty: this is the most successful way of tempting the pike.

Pike are to be allured by a large bait, but a small one is more certain to take them: never suffer weeds to hang upon the hook or bait when recast in the water; it cannot touch the surface too softly. Always prefer a rough wind, and when the stream is clear, for trolling: pike never bite in white water after rain, &c. If a pike goes slowly up the stream after taking the bait, it is said to be a signal of a good fish.

When fishing with a live bait for pike, I always prefer the perch, it being the longest lived on the hook, first cutting off the fin on his back, which is easily done without hurting him. The frog is the next good bait for this fish, but you must be careful to select the water-frog, which breeds in ditches; and choose the yellowest, which the pike likes best. All others, such as the lopsit, the paddock, or land-frog, are considered venomous. Having caught your frog, to keep him alive on the hook as long as possible, *use him thus: put your hook through his mouth—*

mean, pass the arming-wire into his mouth and out at his gills, with a fine needle and silk; sew the upper part of his leg with a single stitch to the arming-wire of your hook, or tie the frog's leg, above the upper joint, to the arming-wire; and in so doing be careful to use him tenderly, that he may live the longer.—This you will find an excellent bait as a ledger-bait. A spoon-bait, drawn quickly through the stream, is very killing for jack, though it is very rarely that a large one is secured by these means. A Paternoster, as described under perch, is by far the most killing way of fishing for pike with live bait, and I have caught them thus nine or ten pounds in weight, though it requires much skill in landing a large one.



THE BARBEL.—The barbel is of a fine cast and handsome shape, with small scales, which are placed after a most exact and curious manner. He is able to live in the strongest streams, but prefers shallow sharp ones in the summer. *Barbel flock* together like sheep; they lurk under weeds,

and like to feed on a gravelly bottom, against a rising ground. They will root and dig in the sand like pigs, and there rest themselves. Sometimes they take to the deep and swift water about bridges or flood-gates, reposing amongst piles or in hollow places, where they will take such hold of the weeds that the swiftest streams cannot



HART'S WEIR.

dislodge them. They hide their spawn in holes they dig for the purpose in the gravel, and cover it over with gravel, to prevent it from being devoured by other fish. This is done *in quiet and deep places*. The barbel only breed and

thrive in rivers. In the Thames there are many, fine and large, and some in the Lea.

As a table fish the barbel is not admired. The flesh is considered unwholesome, and the spawn almost poisonous, especially in the month of May.

But to the angler the barbel presents great attraction, being a game fish, affording excellent sport, mixed with some labour and anxiety. When of a large size, the barbel is exceedingly crafty, sulky, and strong, struggling a long time after he is hooked, often lying motionless at the bottom many minutes, then running under banks, or into large beds of weeds, where he will probably strike your line with his tail till he breaks it. In fact, barbel try every possible way to get off the hook, or break the line, which they certainly will effect if you are deficient in skill, or your tackle is in any way faulty. So cunning is the barbel, that he will suck or nibble off your worm close to the hook, and after that I defy you to hook him. This I have often experienced when fishing at or near Hampton Bridge.

The barbel bites very sharp and sudden; you must strike on the instant, and smartly; immediately raise the top of your rod, keeping your line not too tight. Let him run some considerable distance before you attempt to turn him, then endeavour to keep your fish away from the shelves and beds of weeds. Draw him from the current into deep and still water as soon as possible, and play him *till he has quite lost his strength before you attempt to land him.*

Before you begin to angle for barbel, throw in plenty of ground-bait (you can hardly give them too much), and continue to do so frequently while fishing for them. The best ground-bait is made with soaked greaves and clay, mixed together in balls the size of an egg, also clay and gentils : indent a piece of clay, in which put some gentils, close it lightly, and the gentils will work out gradually when at the bottom of the river. Use this ground-bait only in still holes. A quantity of worms, chopped into small pieces, are likewise a good ground-bait.

In baiting for barbel be sure to have your baits clean and sweet, and the worms well scoured, for he is a curious and dainty feeder. The best of all baits is a well-scoured lob-worm, especially if you should ground-bait the place the night before you intend angling. They will also bite at gentils ; but green ones are the choicest bait for him. Cheese, also, which is not too hard, soaked a day or two in a wet linen cloth to make it tough, is very good : this you may likewise ground-bait the place with. If a little clarified honey was worked into the cheese an hour or so before using it, you would perhaps be more likely to be successful ; but, above all, the lob-worms are as good a bait as any, provided they are well scoured, though it always becomes the angler to try at improvement ; and there are many other baits, such as sheep's tallow and cheese worked together into a paste.

The tackle that I should recommend my little angler, and which I have always found the best, is a long rod of

good strength, for he will find the barbel a heavy and dogged fish to deal with. If once hooked, however, he seldom escapes from a good sportsman.

The barbel feed from May till October, all the day, but best in the morning and evening; indeed, the chance of success increases with the coming night. They will even bite all night, and will feed very freely after rain, when the water is thickened a little.



THE EEL.—There are various kinds of eels,—the silver eel, the common black eel, grigs, &c., varying much in colour, from a dusty black to a bright green. The silver eel has a white belly, and has a clear bright appearance.

The grig is an eel of a smaller kind, mostly to be found about the Thames, up as far as Oxford. Many are to be taken about Westminster Bridge and upwards. In spring they bite freely, when the common silver eels will not.

The eel is the longest-lived fish out of water. When caught, the best means of killing it is to take your baiting-needle and pierce it in the centre of its head. It is an *unpleasant* fish to angle for; for, by its gorging the bait

and hook, you are continually obliged to use your disgorger. However, by thrusting the forked end of the hook downward, and holding the line tight with the other hand, you may easily draw the hook out without hurting or damaging the point or bait, which is most essential to a good angler.

The principal haunts of the eel are under the roots of old trees, holes and clefts of banks, weeds and stumps of trees, in the plain mud, lying in wait for their prey, and under large stones, mill-dams, flood-gates, &c. When the water is rather thickened by rain, they feed greedily.

In angling for eels, let your bait drag on the ground, and fish either with a large garden-worm or the lob-worm—the latter is preferable—in the months of May to July, in cloudy weather attended with thunder and lightning.

But the night angling is far the best for eels, when the weather is hot, and the nights are dark. On shallow, gravelly bottoms they will seize the bait sharply; but give them time, and there will be no lack of good sport till day-break, when they return to their holes.

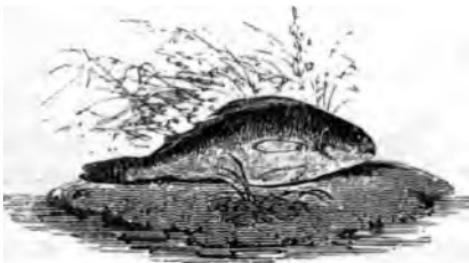
The largest eels are to be taken by night-lines, wound round a bank-runner, and baited with small roach, dace, bleak, or frog, &c. The live gudgeon is, however, better than either of these. You must have a strong line and a gimp hook, with a bullet fastened about three feet from the bait, so as to allow the fish to swim freely. Secure your runner in the bank, and drop the line about four yards into the water. Attend to it early in the morning, as the eel, when hooked, will struggle greatly to free himself. There

are other modes of taking the eel, such as sniggling, bobbing, &c.

Bobbing.—A method of taking eels. It is practised in a boat, with a large bunch of worms suspended by a strong cord from a hole or stout rod, in the following manner. First of all, you must procure a large quantity of worms (marsh-worms are best, though lobs will do), and string them on worsted or coarse thread, by passing a needle through them from head to tail, until you have as many strung as will form a bunch as large as a good-sized turnip; then fasten them on the line, so that all the ends may hang level: in the middle is placed a piece of lead of a conical or bell form, the broad end downwards, which may be got at any of the fishing-tackle shops, made for the purpose. Thus prepared, cast the baits into the water gently, let them sink to the bottom, and then keep raising them a few inches from the ground, and dropping them again until you have a bite, which is easily perceived, as the eel tugs very strongly: be as expert as possible, at the same time steady, in raising your line, so that your fish, in dropping off, may fall into the boat. Immense numbers are taken by this method. During the hot weather always fish or bob in shoal, or rather shallow water, and out of the stream. Most are taken during the night; but they will lay hold freely in the daytime. Rivers in which the tide flows afford the best success, particularly during ebb tide.

THE POPE, OR RUFFE.—This is an excellent fish for a young angler to practise with, for he is a greedy biter.

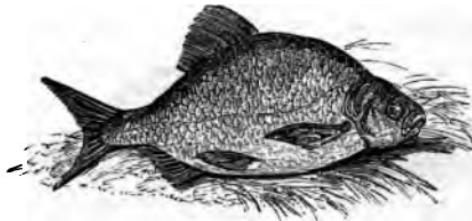
He is not, however, to be met with in all rivers; but in deep waters they often lie together in shoals. The pope is much like the perch in make and flavour, and by many is considered superior. In size he seldom exceeds the gudgeon. To fish for the pope, bait the ground with small



pieces of red-worm, combined with earth or clay, which you will find better than any other ground-bait. Your tackle should be of single hair, but strong, with a hook No. 6 or 7, and a small porcupine float. The rod should be of light bamboo cane. Angle near the ground; and, after a little experience, if the spot be well chosen, the tyro will be enabled to take fifty or sixty at one standing. The pope is a long-lived fish.

BREAM.—Bream are to be found in many parts of the Thames and the Lea, but are more plentifully to be met with in the Trent, Wey, and many other rivers; also at Blackwall, in the wet-docks. In fishing for them, take a gut line, with hook No. 8 or 9, running-tackle and winch, a quill float, and long rod. Ground-bait the place you

intend fishing in with greaves, or bran and clay, well mixed, and thrown into the water in small balls. A few chopped worms introduced will be a great addition. Your baited hook must drag half an inch on the ground in streams; and you must fish early in the morning or late at night, as bream will not feed in the middle of the day.



The months in which they bite most freely are March, April, and May: when the wind blows, or warm rains fall, they will bite all day, provided you have taken care to have your place well baited the previous night. Bream will take gentils, paste, &c., but the scoured marsh-worm is far the best. In angling for bream, be sure to fish out far in the stream—much farther than if you were angling for roach; and, when you have a bite, strike immediately.

There are many bream to be taken in a still piece of water to the right of Isleworth Bridge; and a pleasant spot it is, overhung with large willows, and free from any interruption. Here you may use two rods and lines. Placing a rod over some rushes or the bough of a tree, throw your baited hook a considerable distance into the water. The

bait must hang just clear of the ground (to ascertain which you should previously plumb the depth), so that a slight breeze may move it. Be careful to stand a little back, waiting quietly for a bite; by so doing you may expect good sport and a plentiful supply of fish, for the bream is a fast-biting fish, and affords much amusement to the angler, though but little to the gourmand, being terribly bony. Bream are generally to be found where there are carp and tench. They are sometimes as much as six pounds in weight, and will struggle hard when first hooked; but give them plenty of line before you attempt to turn them; for, like the barbel, they are of a sulky disposition, and will remain quiet for some time, and then make a rush for the bank, weeds, &c. With patience and perseverance you may secure a good catch.





INN AT MARLOW.

RULES AND HINTS TO BE OBSERVED IN ANGLING.

1. Never angle in glaring colours, for they are the easiest to be discerned by the fishes ; always turn out early in the morning, for that is the best time of the day ; keep your tackle always neat, and let your baits be in the highest perfection.

2. When you angle, shelter yourself as much as possible from the sight of the fish, for they are timid and easily frightened ; and when you angle for trout, you need never make above one or two trials for him in the same day ; for he will in that time either take the bait or let it alone.

3. You will have little sport (and that certainly not with *large* trout) on those days which follow dark, cloudy, or windy nights, for on these nights they range about and devour small fish. The best days for sport are those which are overcast and gloomy, following bright moon or starlit nights. At such times the fishes are as timid as in sunshiny days, and never stir from their holds ; and thus having abstained from food during the night they are hungry and eager, and being encouraged by the gloom of the day they range freely about and bite the more readily. You will seldom miss catching fish that swim upon the stream to seek what food the water brings down with it.

4. Never trust to the strength of your rod or line when you have hooked a good fish, but always use your landing-net.

5. Your rod must neither be kept too dry nor too moist, for the one will make it brittle, the other rotten ; in sultry weather always wet the joints of your rod, which will make them adhere ; and if by being wet they should stick so that you cannot easily get them asunder, never use force, for then you will strain your rod ; but turn the ferrule of the joint that is *fast* a few times over the flame of a candle, *and it will separate*.

6. The best times for angling are from April till October, and the best time of the day from three till nine in the morning, and three in the evening till sunset. The south wind is the best for anglers; the next best point to that is the west; the cooler these blow in the hottest months the better is the time to fish.

7. Never angle in an easterly wind, for your labour will be in vain; but you may if the wind blows from any other point, provided not too sharply. Fish will never bite before a shower of rain: this hint may save you many a wet skin.

8. In the morning, if there happens to be a hoar frost, either in the spring or the advancing of the season, fish will not bite that day, except in the evening; and after they have spawned, they are very ill, and will not bite, till with grass and weeds they have scoured themselves, and by that means recovered their appetite.

9. The best time for the trout to be taken, and other fish with the ground-line, is morning and evening, in clear weather and water; but if the day proves cloudy, or the water muddy, you may angle all day long.

10. The angler may depend on catching store of fish in a dark, close, gloomy, or lowering day, if the wind be southerly.

ARTIFICIAL FLY-FISHING.

THE art of artificial fly-fishing certainly has the pre-eminence over the other various methods that are used to take fish by angling. It requires a great deal of ingenuity and attention; and the variety which attends it, makes it at once both pleasant and agreeable. The angler is not confined to any particular part of the water in fly-fishing, but roves from one place to another, trying his fortune, by throwing his flies into the different eddies, streams, and most likely places he meets with, to make a captive of the speckled trout.

The secret of all artificial fly-fishing is an accurate imitation of the flies moving on or round the various streams, at different seasons of the year, from March to September, outside of which months the fly-fisher will not accomplish much. It would be of little use to describe the manner of making flies; the young angler had better seek the guidance of some experienced hand; but I will give him a list of the principal flies, and when they are to be used, with hints how to get and use his rod and line so as to be of real service.

FLY-ROD AND LINE.—The length of the fly-rod is generally from about fourteen to seventeen feet, which is long enough, for any one who understands fly-fishing, to throw twelve yards of line, with one hand, and seventeen with both. To make a fly-rod, that will be exceedingly neat and pleasant in hand, you must observe the following method:—*Procure a nice breadth of ash plank, free from*

knots, perfectly sound, and about seven feet long ; let it be turned in the lathe so as to run taper from the butt-end, which should be just so thick that you can with ease grasp it in your hand. Then have it ferruled, or bind it to a piece of hazel seven feet long, and in exact taper proportion to the ash. As you may not be able to get a piece of hazel so long, that will run perfectly taper, it may consist of two or three pieces ; add to the hazel a nice piece of yew (in the same proportion to the hazel as that is to the ash), two feet long, made round, taper, and smooth ; and to that, piece a bit of small, round, and taper whalebone, six inches long ; the rod will then be completed ; and if just symmetry is observed through the whole, it will be a most excellent one. Let your rod, thus made, be ringed for the line to pass through, with small brass rings, about a foot distant from each other, and at the butt-end let there be a spike made to screw in, which you will find very convenient ; and you may, if you like to alter the colour of your joint, first warm it before the fire, and then dip a feather in aquafortis, put it on the ash, and then chafe it in with a soft rag, and it will make it a cinnamon, or rather a puce, or flea colour.

Your fly-line should be about thirty yards long, and wound on a small brass multiplying winch, which is to be placed on the butt of your rod. Then you must run the line through the rings before mentioned, and you may always command the length without the trouble of changing the line, and shorten it when you come to places encumbered

with wood. The general length that you should have off your reel must be about four yards longer than your rod; nay, sometimes the line must be twice the length of the rod; for, to fish fine and far off is the standing rule for trout fishing. But it will be a long time before you are able to throw a dib-line with nicety at the general length; yet, as you can always lengthen or shorten it by means of the winch, you may, if you are expert, and are a true lover of angling, after some trials accomplish it. Never encumber yourself with too much line at first, but increase the length of it as you find you make improvement; and as it is ten to one that you lose a fly every time you cast your line, until you are arrived at some degree of perfection in doing it, it will not be amiss to practise some time without one. Your line should run taper from the top of your rod down to the fly; that is, if the first link is composed of thirty-five hairs, the next must be of thirty-four; so leaving out one hair in each link, till the whole is completed; then comes the silk-worm gut, on which you should whip all your hooks. But the best lines for artificial fly-angling are those that are wove, and are all one piece. They are to be bought at any of the shops in London where fishing tackle is sold, running taper like the lash of a coach whip, and may be had of any length. These are the only lines that can be used on a winch; because they have no knots to prevent them running glibly through the rings of the rod. By the line being made taper, you will be able to throw *it into any place you like* with greater exactness,

and it will fall much lighter on the water, which will very much increase your sport.

ARTIFICIAL FLIES.—The Palmer and the May-fly are the grounds of all artificial fly-angling. The varieties of the Palmer will take fish all the year round. We append a list of the principal flies suitable for each month :—

MARCH—THE PALMERS.

1. Dark Brown.
2. Green Whirling Dun.—Taken best late in the evening, on a blustering warmish day.
3. Early Bright Brown.
4. Thorn, or Hawthorn Tree Fly.
5. Blue Dun.—Taken from eight to eleven, and from one to three.
6. Little Black Gnat.
7. Late Bright Brown.—This fly, if well made, will appear a bright gold or amber if held between the eyes and the sun.

APRIL—THE PALMERS.

1. Dark Brown.—Kills best from eight to eleven.
2. Violet Fly.—Is taken about the middle of the month if the season be an ordinary one.
3. Little Whirling Dun.—This fly comes on the water the 12th of this month, and is taken in the middle of the day, and in blustering weather, to the end of June.
4. Yellow Dun.
5. Horse-flesh Fly.—This fly is taken all the month two hours before sunset till twilight.
6. Small Bright Brown.—In a bright day in clear water.

MAY—THE PALMERS.**THE MAY-FLY.**

1. Dun Cut.—A great killer on the evening of a showery day.
2. Stone Fly.—On the water from the middle of April to the end of June.
3. Black May-fly.
4. Little Yellow May-fly.
5. Grey Drake.—Used towards evening when the fish are glutted with the Green Drake.
6. Camlet Fly.—For small fish to the end of June.
7. Cow-dung Fly.—For cold and windy days.

JUNE—THE PALMERS.

1. Ant Fly.
2. Purple Gold Palmer.
3. Little Black Gnat.—After a shower of rain in an evening.
4. Brown Palmer.
5. Great Red Spinner.—Till the latter end of August, after six until twilight.
6. Small Red Spinner.—For clear water and a bright day.

JULY—THE PALMERS.

1. Badger Fly.
2. Orange Fly.—When the May-fly is over, in hot, close weather.
3. Wasp Fly.
4. Black Palmer.
5. Black Silver Palmer.
6. July Dun.

AUGUST—THE PALMERS.

1. Late Ant Fly.
2. Fern Fly.
3. White Palmer.
4. Hearth Fly.—From ten in the morning until three in the evening.
5. Pale Blue.
6. Harry Long Legs.—Chiefly for cloudy days.

SEPTEMBER—THE PALMERS.

1. Peacock Hackle.
 2. Camel Hackle.
 3. The Late Badger.
 4. September's Dun.
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RULES FOR ARTIFICIAL FLY-FISHING.

THE best fishing is in a river somewhat disturbed with rain, or on a cloudy day, when the waters are moved with a gentle breeze: the best winds are the south and west; and if the wind blows strong, yet not so strong but that you may conveniently guide your tackle, the fishes will rise in the still deeps; but if there is little wind stirring, the best angling is in swift streams.

In casting your line, do it always before you, and in such a manner that the fly may fall first on the water, and as little of your line with it as possible; but if the wind is *high*, you will then be forced to drown a good part of it, *that you may keep the fly on the water*. Endeavour, as

much as you can, to have the wind at your back, and the sun in your face; but the winding of the river will frequently render that impracticable. When you throw your line, wave the rod in a small circumference round your head, and never make a return of it before it has had its full scope, for if you do the fly will snap off. Even if the day is cloudy and windy, and the water thick, you must keep the fly in continual motion, otherwise the fishes will discern the deceit.

"Upon the curling surface, let it glide,
With nat'ral motion from your hand supplied,
Against the stream now gently let it play,
Now in the rapid eddy float away."

Let the line be twice as long as the rod, unless the river is encumbered with wood; and always stand as far off the bank as the length of your line will permit, when you cast the fly to the contrary side. But if the wind blows so that you must throw your line on the same side you are on, stand on the very brink of the river, and cast your fly at the utmost length of the rod and line, up or down the stream as the wind serves. You must have a quick sharp eye, and active hand, to strike directly the fish rises; or else, finding the mistake, he will throw out the hook. Small light-coloured flies are for clear waters and clear atmospheres; large dark-coloured flies for the contrary. When, after rain, the water becomes brownish, an orange-coloured fly is taken greedily. When the fish rise at the fly very often and yet *do not take it*, you may conclude that it is not what they

like ; therefore change it for the one they do. When you see a fish rise, throw your fly over him, and draw it gently over the place where he rose ; and if it is a proper fly for the season, and you cast it with a nicety, the fish is your own. When you angle in slow-running rivers, or still places, with an artificial fly, cast it across the water, and let it sink a little in the water, and then draw it gently over to you again, letting the current carry it slowly down : this is the best way for slow waters ; but for quick ones your fly must always swim on the water under the continual inspection of your eyes, which ought, for this kind of angling, to be as sharp as the basilisk's. It is a good plan always to carry some dubbing, gut, hooks, and silk, with you, in a small pocket-book, that you may be able to imitate any fly you see the fish rise at more than others. The lighter your flies fall on the water, the better : this you will not accomplish by strength, but by practice, always raising your rod by degrees, after you have made your cast. A young angler should never use more than one fly on the stretcher at first, but when he can throw out pretty well, he may add to the stretcher one or more droppers, observing always to let them be one yard asunder.



SKATING.





SKATING.

They sweep
On sounding skates a thousand different ways,
In circling poise swift as the winds.—THOMSON.

ALTHOUGH the ancients were remarkable for their dexterity in most of the athletic sports, yet skating seems to have been unknown to them, probably because those nations which most excelled in such exercises were located in climates affording no opportunity for this special sport. The invention probably owes its origin to Holland, where it has been practised from time immemorial, not only as a graceful and elegant amusement, but as an expeditious mode of travelling when the lakes and canals are frozen up during winter. Long journeys are often made upon skates, with ease and expedition; the female peasantry, not less than

those of the other sex, being perfectly at home in their use to and from the market towns which they frequent on business, often poising a basket of eggs upon their heads. It may be readily supposed that, when their use is a matter of such constant occurrence, much less attention is paid to graceful and elegant movements than to celerity, than in those countries where opportunities for the exercise are of rarer occurrence, and when it is consequently used only for amusement. Certainly there is no exercise calculated to display the human figure to greater advantage in the variety of graceful attitudes and movements it exhibits. The acquirement of most exercises may be attained at an advanced period of life; but to become an expert skater it is necessary to begin the practice of the art at an early age. It is not easy to reduce the art of skating to a system admitting of description on paper. It is principally by watching first-rate performers that a young skater can best form his own practice. Until of late years the English have not had the reputation of being graceful skaters, though some splendid exceptions to this have been half a century ago displayed on the Serpentine. In truth, there is no spot in the United Kingdom where such masterly exhibitions of the art are made, whenever the ice renders it possible, as in Hyde Park. Of late, some magnificent scenes have been displayed there by torch-light, affording also a facility for robberies and personal assault, of which *the practised thieves of London were not slow to avail themselves.* The "Saturday Review," of January 14, 1865,

in an amusing article on this subject, states that, "on the Witham, some winters ago, the Lincolnshire Volunteers trained themselves for the feat by which a Dutch army once repulsed a force of Frenchmen on the Scheldt, and, with rifle in hand, skated down the river to Boston, in 'fours,' with the captain at their head, majestic and wonderful to behold."

The practice of cutting figures of small curve on the ice, though exciting wonder in the uninitiated, is by no means the finest specimen of skating prowess. It gives no room for the expansion of the chest, or the tension of the muscles. On the other hand, a great breadth of curve gives full play to the figure and manliness to its attitudes. Fault has been justly found with the form of skates prevalent in England, as being too much curved, thereby involuntarily bringing the user of them round on the outside upon a quick and small circle, whereas, by using skates of a different construction—less curved, he has the command of his stroke, and can enlarge or diminish the circle according to his own wish: the best shape is *nearly* straight until it reaches the curve beyond the toe. Another defect in construction is the too great depth of the iron, throwing all the purchase of the stroke upon the ankle, at the risk of *spraining* it. The wood cannot be too near the ground, so that it is kept clear from contact with it. A fluted edge to the iron is certain to be speedily clogged with pulverized ice, and expose the wearer to serious risks.

For fastening the skate to the heel of your boot, a

screw is unquestionably the most secure, while it lasts. But as it will probably be only a few days in the boot, it is preferable to have a peg well secured to the wood, and inserted by a tapering hole in the boot. The additional security of a heel-strap passing through the wood, and buckled above the instep, is important. Two other straps, one before and the other behind the ball of the foot, will be sufficient. It is the safest way to kneel on one knee while putting on the skates.

As to the mode of using them, we cannot do better than quote the following instructions given by a member of the Edinburgh Club, who had devoted special attention to the subject:—"Those who wish to be proficient should begin at an early period of life, and endeavour to throw off the fear which always attends the commencement of an apparently hazardous amusement. They will soon acquire a facility of moving on the inside: when they have done this, they must endeavour to acquire the movement on the outside of the skates; which is nothing more than throwing themselves upon the outer edge of the skate and making the balance of their body tend towards that side, which will necessarily enable them to form a semicircle. In this, much assistance may be derived from placing a bag of lead shot in the pocket next to the foot employed in making the outside stroke, which will produce an artificial poise of the body, which afterwards will become natural by practice. At the commencement of the outside stroke, the knee of the employed limb should be

a little bent and gradually brought to a straight position when the stroke is completed. When the practitioner becomes expert in forming the semicircle with both feet, he is then to join them together, and proceed progressively and alternately with both feet, which will carry him forward with a graceful movement. Care should be taken to use very little muscular exertion, for the impelling motion should proceed from the mechanical impulse of the body thrown into such a position as to regulate the stroke. At taking the outside stroke the body ought to be thrown forward easily, the unemployed limb kept in a direct line with the body, and the face and the eyes looking directly forward; the unemployed foot ought to be stretched towards the ice, with the toes in a direct line with the leg. In the time of making the curve, the body must be gradually and almost imperceptibly raised, and the unemployed limb brought in the same manner forward; so that, at finishing the curve, the body will bend a small degree backward, and the unemployed foot will be about two inches before the other, ready to place on the ice, and form a corresponding curve. The muscular movement of the whole body must correspond with the movement of the skate, and should be regulated so as to be almost imperceptible to the spectators. Particular attention should be paid to carry round the head and eyes with a regular and imperceptible motion; for nothing so much diminishes the grace and elegance of skating *as sudden jerks and exertions, which are too frequently used by the generality of skaters.* The

management of the arms likewise deserves attention. There is no mode of disposing of them more gracefully in skating outside, than folding the hands into each other, or using a muff. There are various feats of activity and manœuvres used upon skates ; but they are so various that we cannot detail them. Moving on the outside is the primary object for a skater to attain ; and, when he becomes an adept in that, he will easily acquire a facility in executing other branches of the art.

"There are few exercises but will afford him hints of elegant and graceful attitudes. For example, nothing can be more beautiful than the attitude of drawing the bow and arrow while the skater is making a large circle on the outside : the manual exercise and military salutes have likewise a pretty effect when used by an expert skater."

None but the most expert skater can carry a stick without risk to himself and others, and he would be the most likely to dispense with it.



FENCING.

IN the days when every one laying claim to the title of "gentleman" carried a sword, the art of fencing was much more cultivated than it is at the present day. It is not recorded when the rapier, the forerunner of the modern small sword, was introduced into England; but it is known to have been in use in the sixteenth century. Originally introduced from France, like many other French fashions, it soon became "the rage," and "professors of the noble art of (self) defence" soon followed in its wake, and established themselves in London, their terms for a complete course of instruction being very high. Our young nobles prided themselves on being masters of the "small sword," and notwithstanding the opposition offered by the clergy, the satirists, and general public, the rapier became so fashionable that the term "sword" seemed forgotten. Like most *fashions*, this was carried to such an excess that in the

reign of Elizabeth parliament deemed it necessary to pass an Act limiting the length of the rapier to three-and-a-half feet. The anxiety of the "gallants" to evade this law was such that men were stationed at the gates of London to measure the weapons of all passing to and fro, and to break those exceeding the prescribed length. Eventually the rapier was laid aside for the small sword, which became even a greater favourite than its predecessor, men of every grade considering a small sword a part of their necessary holiday equipment. This custom continued till nearly the close of the eighteenth century, when it was abolished, the wearing of swords (except with court dress) being now given up to our military and naval defenders. The art of fencing is now practised as an elegant accomplishment, giving grace and agility to the movements, quickness and steadiness to the eye, and tending to cultivate steadiness of nerve and presence of mind.

Fencing, we have seen, is the proper use of the small sword. It is taught and practised with foils, having a button on the end, which should be covered with leather, to lessen the effect of a thrust. Foils for the use of men are thirty-one inches in length, exclusive of the handle. The pupil should wear a mask of *stout* iron wire to protect his face; his right hand should be covered with a glove padded on the back and fingers; his dress should be quite easy, eschewing long loose garments; and it is usual to have a piece of cloth, shaped like a heart, attached to the left breast.

The *Foil* should be held in such a position that when you place yourself on guard the two edges are horizontal. The pummel should rest under the wrist, while the thumb should approach within an inch of the shell, being laid on the upper part of the hilt.

Position.—To attain the true position, without which it is useless to hope for proficiency, the pupil should stand perfectly upright, his eyes fixed on, and presenting his right side to his opponent. The pummel of the foil should rest under the wrist, and the hilt be held flat in the hand, with the thumb stretching along the flat part to within half an inch of the shell ; then with shoulders thrown back, head erect, heels together, and feet at right angles, imitate the movement of drawing the foil as a sword from its sheath, at the same moment raising the left hand until the foil is held horizontally above the head, the left hand near the point. This is the position of the left arm and hand when on guard.

On *Guard*, slightly bend both knees, and with the right foot take one step in advance in the same direction as that in which the foot was pointed, keeping it in line with the left heel. Let the point of the foil be directed towards the eye of your opponent, while the pummel is a little below the level of your own breast. Your right hand should then appear with the flat part of the finger-nails upper-



most, while the left retains the upright position previously described. The blade of the foil should be so poised as



just to keep your opponent's point out of the line of your body inside. In this position the weight of the body should rest entirely on the left leg, which should be slightly bent, so that the knee projects as far outwards as the toe. The right leg should be (from the

knee) perpendicular with the heel. The head must be thrown back, and you must look over your right arm at your opponent, remembering that it is of much more importance to watch his wrist than his eyes.

The *Appel* is made by stamping twice with the right foot, taking care that the position of every other part of the body is maintained, and that the point of your foil does not deviate from the direction in which it was first presented. This movement is to show that you are on guard, and should be frequently repeated till you can maintain your position with ease and accuracy.

Extension.—Raise the hilt of your foil as high as your mouth, throwing the point vigorously towards the breast of your opponent. Straighten the left leg, but keep the

foot flat on the ground, and let the right knee project a little beyond the toe ; let the left hand fall gracefully until the arm is straight, and the hand (palm outwards) two or three inches from the left thigh. Keep your right side towards your opponent, who should not be able to see your left arm. In assuming this position the first movement should be made with the right arm.



The *Longe* is made from the above position, and is performed by advancing the right foot just so far that you conveniently recover, keeping the sole of the left flat on the ground. The head and shoulders must be thrown back, the right side presented to your opponent, the right

hand while making the thrust on a level with your eyes, while the left is held as in the previous position, and so that it cannot be seen by your opponent. In all these positions observe that the right knee must not be turned in, or it will inevitably destroy your balance.

To Recover.—Having been careful not to advance your right foot too far in the longe, you will be able (as soon as you have delivered the thrust) to spring nimbly from the right heel to your original position or guard, raising the left arm, and bending the left knee, as previously directed, carefully opposing to your adversary the point of your foil, with the right arm extended. On resuming your guard stamp your right foot twice, showing the body is balanced on the left.

Engaging and Disengaging.—To engage, whether in quarte or tierce, is to oppose your opponent's blade either on the inside or outside, when you first cross blades. You disengage by dexterously shifting the point of your foil under the wrist of your opponent from one side of his blade to the other, that is, from quarte to tierce, or *vice versa*, such movement being no more than is sufficient to clear the blade of your opponent. If his point be lower than his hand (which it will be in the parades of circle, octave, and quinte), the disengagements must be made over the wrist.

Straight Thrusts are used as attacks where an opponent *when on guard* leaves an opening on the same side of his *body as that on which you join blades*. When you have

such an opportunity raise your wrist sharply, so as to bring the forte of your weapon to the foible of his, and promptly lunge on the same side to his breast, preserving at the same time a correct opposition. Straight thrusts are also made as returns. Having parried the attack with a smart jerk from the wrist, deliver your return quickly with an extension, before your opponent has time to recover his position or get his blade into line again.

Advancing and Retreating. — In advancing, move your right foot easily forward, bringing up the left so rapidly to the proper distance that the two actions should be almost simultaneous. Repeat this several times, keeping your body and guard firm and steady, with a short pause between each forward movement to observe if your distance and position be the same as when you commenced. In retreating, the left foot makes the first movement, the right following as quickly as possible; the guard and position being maintained as in the advance.

It will be of advantage to the young pupil to practise the *guard, extension, lunge, and recovery*, at a mark on the wall, until he has acquired a certain degree of precision and skill in performing the various movements. To do this he must carefully note the various movements of body and weapon, discriminating between the positions of each. All these motions should be made freely and vigorously, so as to deceive your opponent, and cause him to oppose with the opposite parade; remembering, however, to use no more force than is just necessary to keep your opponent's point

out of line with your body. It is of considerable importance that the pupil should steadily drill himself in these positions before he faces an opponent, since, unless he has learned to perform them with celerity and exactness, he will be unable to recover himself after longing or changing position.

PARADES.

These are six in number, viz., *quarte*, *tierce*, *circle*, *octave*, *prime*, and *quinte*. There are also three divisions of the body reckoned in fencing, thus : over the arm, or outside of the blade ; under the arm, and inside of the arm or within the blade. *Tierge* and *prime* are intended for the outside defence ; *octave* and *quinte* for under the arm defence ; and *quarte* and *circle* for the inside division.



Quarte being an inside parade, to oppose the thumb on an inside thrust the flat part of the nails are upwards.

Tierce being an outside parade, the position of the hand is reversed, that is, with the nails downwards.



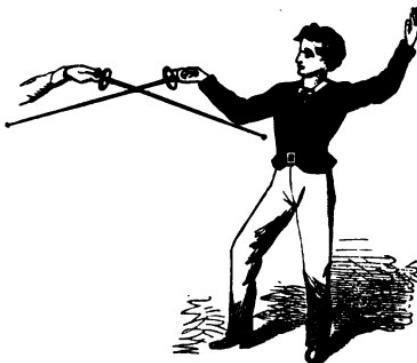
Quarte over the Arm is the same as quarte inside, with this difference, that the head is raised upright on the inside, while the hand is opposed well outward. In the thrust of tierce the wrist is reversed, the right hand well up, and opposed outward, the left being also reversed, having the back of the hand outward.

Prime is performed for the purpose of opposing thrusts directed to the upper part of the person, thus: raise the right hand till it is nearly level with



the shoulder, the nails downward as in tierce, allowing the point of the foil to drop slightly below the level of your wrist, and pointing towards the right side of your opponent: by this movement the whole upper part of your body is crossed and covered by your foil.

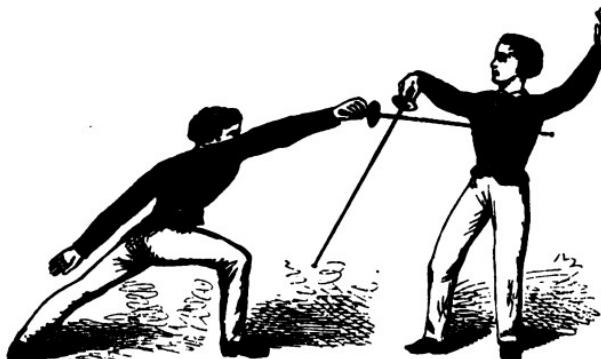
In *Circle* the foil is held with the finger-nails upwards, your wrist higher than that of your opponent, and the point of your blade lower than his. Its chief use is to guard against low thrusts.



Octave is the parade used to repel all thrusts made under the arm, and therefore, although the positions of wrist and foil are the same as those in circle, the movement is made on the opposite side of the body.

Quinte is the parade best adapted to cover the body under the arm, and to throw the point of your opponent's *blade out* towards the right side. The hand must be *raised to the same height as in prime*, the point of the foil

dropped so as to cover the body under the arm, the wrist in the same position as prime, *but*, the thumb must be brought under the hand, with the nails turned outwards.



The *Counter, or Round Parade, in Quarte* may be used against any of the outside thrusts, and is thus made: when your opponent disengages to the outside of your arm, perform a small circular motion round his foil, and resume your former position of quarte.

The *Counter in Tierce* is used to repel all attacks within the arm, and is performed in the same manner, only that the course of the point is reversed. If you intend making a quick return after your opponent has attacked, you must make your parade with a quick, sudden jerk of the wrist, so as to throw his blade quite out of the line of your body before he can recover his guard; but if you purpose making any feint after performing the parade, in making the *parade oppose your foil so gently to that of your oppo-*

nent that the blades do not quit each other until he again comes on guard, and then begin your feint. The pupil should know thoroughly those parts of the foil distinguished as the *forte* and the *foible*. The part called the *forte* is that which extends from the shell of the guard to half the length of the blade; the *foible* is the remaining portion of the blade. It being necessary in parrying that the forte of your blade be opposed to the foible of that of your opponent, you must be very careful of the position of your arm with respect to the proximity of his blade to your body when the weapons cross, for if his blade approaches within a few inches of your body you must draw back your arm before you can make the parade, so as to permit your own blade to have the full effect, and prevent his touching you.

Having now given my young readers some information on the first steps in fencing, and believing that no one ever became an expert, without actual instruction by a master of the art, it seems useless to follow out the various movements, perfection in which can only be acquired by actual practice under the eye of a competent instructor. I will therefore conclude this article with a few general remarks.

Fencing being an elegant amusement is, if properly followed, a useful one also, not only affording salutary exercise, but giving a graceful deportment, easy carriage, *vigour to the eye*, strength to the muscles, steadiness of *nerve*, presence of mind, promptness, and decision. That

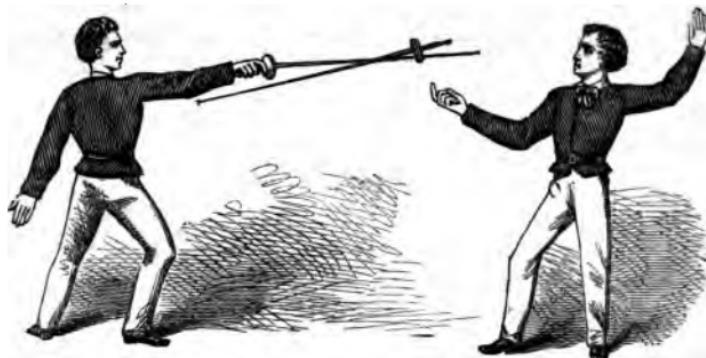
the pupil may thoroughly avail himself of these advantages it is essential he should pay due attention to position, and have frequent practice of the various changes necessary in the parades, especially in extension, recovery, advancing, engaging, disengaging, etc., before coming to the assault. Many a promising pupil has lost his chance of excelling by his too great eagerness. Fine fencing greatly depends on the facility and neatness with which you can perform the counter parades. It is a great mistake for a fencer to have any favourite points; he should try and endeavour to be equally expert in all, since in each he may be met and deceived by a counter parade or a feint. The counter parades, as their name implies, consist in following your opponent's blade in such a manner as to keep him in the same engagement; they are performed entirely by the wrist, which gains greatly in power and suppleness by constant practice. These counter parades are rarely practised except for mutual instruction, and are of service to the tyro in fencing in giving him correct ideas of what may be done with his weapon, teaching quickness of eye and readiness of hand the while they do not necessarily cause change of position. Feints are practised for the same object, and are used for the purpose of deranging your opponent's guard, so that an opening for a thrust may be made. *Parrying feints* is employing the various parades so that your opponent shall not be able to find such opening. If the pupil has steadily drilled himself *until he is able to perform all the parades and*

thrusts with neatness and celerity, he should frequently practise them with an opponent who only assumes the defensive. He ought then to bring all his resources into active operation, never flinching or retreating to avoid a touch. This practice ought to be continued until he feels himself considerably more master of his opponent than when he commenced. It is almost impossible to have too much practice before engaging in the assault.

In commencing the assault the pupil should act on the defensive, varying his parades constantly, so that he may be the more likely to find out the favourite points of his opponent (should he have any), while at the same time he prevents him from finding out his own. Remember, that hits are reckoned good *only* on that portion of the right side between the waistband and the neck. Hits on the right arm do not count. Skilful fencing depends more upon the proper education of the hand, sound and correct judgment, and a thorough knowledge of all the points, than on quickness of eye, though that is a quality not to be disparaged. Endeavour to discover the design of your opponent with a view to frustrate, by opposing it, remembering that, though dexterity of hand and quickness of eye are no mean advantages, a thorough knowledge of the whole resources of the art will be of more value to you than either. With this knowledge the fencer can tell by the feel of the blade what his opponent is about to do, and *can decide* on the parade he intends to adopt. In all *practice* be more anxious that your exercises are performed

with neatness, quickness, and precision, than to obtain advantages. It is thus you will acquire that grace of deportment which is so great a recommendation. Let good feeling always prevail; do not be either cast down or irritated by failure, nor unduly exalted by success, bearing in mind that those positions may be reversed at the next encounter. To conclude, never engage with an opponent, for however slight a movement, without the masks. However certain you may be of your own prowess, the merest accident might result in the loss of an eye or other serious injury. I can now only wish you success, and hope you may not meet with an opponent who has learned the *trick* of

DISARMING,



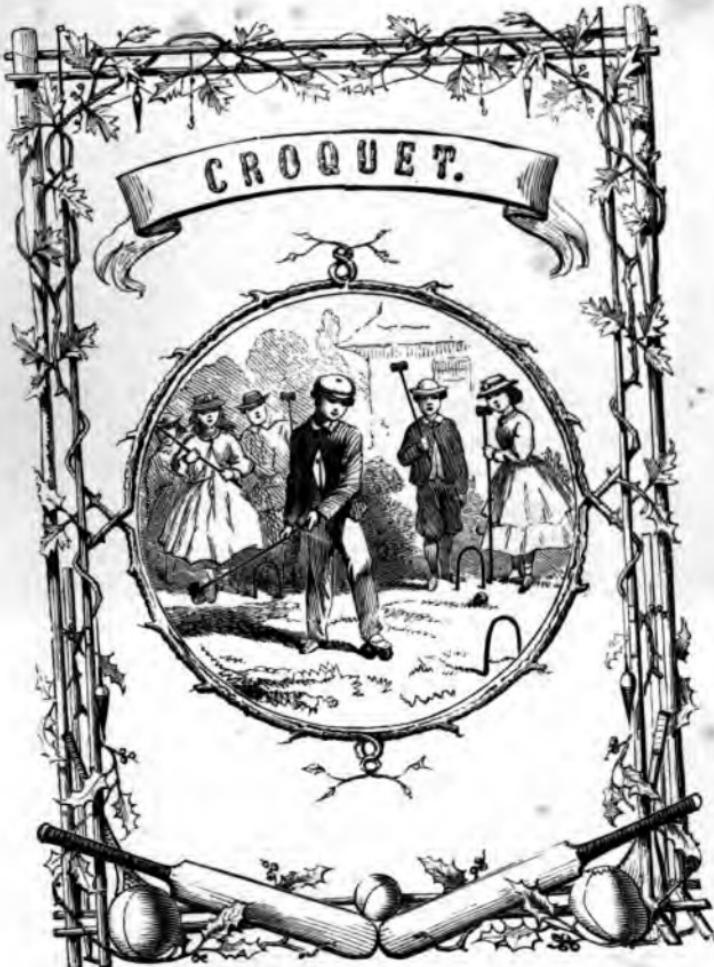
which no person who aspires to be a complete fencer would ever condescend to perform.

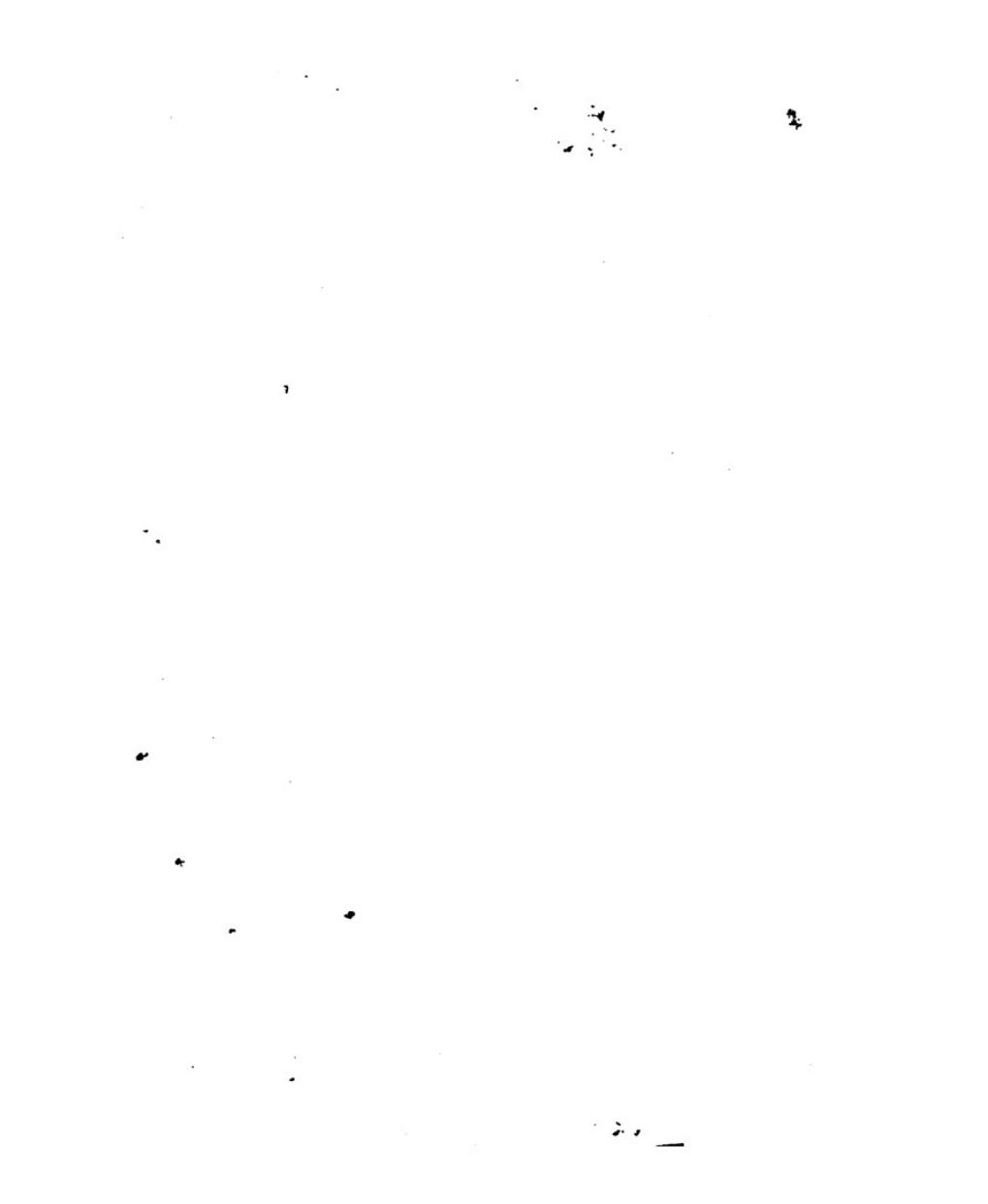


CROQUET.

THE game is played on a level closely-mown lawn, which should be often rolled so as to make the ground solid. The implements comprise ten bridges, which are made of pieces of iron rod sharpened at both ends and bent in the middle into the form of staples, with a span of about twelve inches. Eight balls, which should be made of a light wood that will not readily split, ten inches in circumference, and each ball painted of a different colour. Eight mallets, the heads of which should be four inches long, with a circumference at each end of seven inches, tapering to the middle; the shanks or handles should be perfectly straight, of a thickness to be conveniently grasped by a lady, and the total length of the mallet thirty inches. Two stakes are also

CROQUET.





required, which may be of either wood or iron, but must not exceed two feet in length; the portion out of the ground may be coloured in rings to match the balls.

Terms used in the game :—

ROQUET.—A ball makes roquet when, after being struck with the mallet, it comes in contact with another ball.

CROQUET, when a ball has been roque'd, the player takes his own ball up and places it close to the roque'd ball, pressing one foot on it so as to hold it firm, and then with a blow of the mallet drives the roque'd ball in the direction he wishes; this method of croqueting or cracking the balls gives the title of the game.

ROQUET-CROQUET is when the croquet is made on the roque'd ball without using the foot, and both balls are driven away.

RICOCHET is when a ball makes roquet on more than one ball from one blow of the mallet.

CONCUSSION is when a ball is displaced by one that has been driven against it by roquet, croquet, ricochet, or roquet-croquet, and not by the playing ball.

NURSING is roqueing or croqueing a ball, either of your own or the opposite parties, so as to increase or lessen its chance of success.

BOOBY, a ball that has not succeeded in passing the first bridge after being struck.

ROVER, a ball that has passed under all the bridges but not struck *the foot-stake*.

The game may be played by any number of players, but becomes long, and may prove tedious if there are more than eight engaged. Having selected the ground and arranged the boundaries, the first thing to be done is to place the stakes and bridges, which is managed in this way: a stake called the foot-stake is driven in, say ten feet from the boundary which forms the base of operation; and then another, called the head-stake, is driven ten feet from the boundary on the opposite side, and a string made fast from one stake to the other; then at the distance of say ten feet from each stake a bridge should be placed, using the string as a centre, and at another interval of ten feet from, and in a line with, each bridge, another bridge; then from the centre of the string, and equi-distant from it, and from the boundary on each side, plant two more bridges, that is, one on each side of the string, and equi-distant from each side boundary; then on each side of, and in a line with, the two bridges last planted, place two more bridges at intervals of ten feet; you will thus have ten bridges, four of which are in a line with the stakes, that is, two for each stake, and three on each side, with a space of ten feet between each bridge, which will give a distance between each stake of sixty feet; the end boundaries being ten feet from each stake, and the side boundaries rather more than ten feet from the bridges on each side.

Having arranged your bridges and stakes, you then proceed to choose partners or sides for playing. Two leaders are first chosen, who each choose one partner in succession.

The leaders use the balls which correspond in colour with the two first rings on the stakes, and as the partners are chosen, they take the colours of the next rings. If there are eight players, two sets of partners, of four in each set, may be formed, or four sets of two each. If only seven, the game may still be played as if there were eight, one of the players taking two balls and having two turns of play. If there are six, the game may be played with two sets of three each, or three sets of two each. If only five, then by one player using an extra ball, the game may be played as if there were six. When there are four players, there may be two sides of two each, with single balls, or of four each with two balls to each player. Three may play the game of four by one taking two balls, or of six by each using two balls. When only two play, each player uses two balls and plays them alternately.

Before the play commences you must decide upon the place from whence the balls must first be played; this should be between the foot-stake and the nearest bridge, two and a half feet, or the length of a mallet, from the stake.

In playing, the object is to propel the ball through all the bridges by blows from the mallet, going through the two bridges nearest the foot-stake first, then cornering and passing through the three bridges on the left side from the starting point, then cornering again and passing through the two bridges nearest the head-stake, striking the stake, and again passing the bridges downwards, then cornering again and passing through the three bridges on the right, cornering again and passing through the first two bridges.

nd striking the starting stake: whichever side succeeds n doing this first, is the victor.

The players on each side take their turn of play alternately, the leaders taking precedence, and each player continuing as long as he makes a point; the points are *when the ball runs its proper bridge, strikes the head-stake, makes a roquet, or ricochet, or a croquet, or roquet-croquet.* The failure to do any of these ends its turn, and it must remain at the mercy of other players till the turn comes round again. A ball is also put out of play (for that turn) when (without intervening play) it strikes a ball which has been previously roque'd, ricoche'd, or croque'd. If in the act of croquet the player's ball flinch from under his foot, it is out of play for that turn; and if (when the croquet is refused) the roque'd ball is displaced in playing, a like penalty follows. A player may decline his turn of play, or at any time leave it unfinished.

The bridges can be passed only in the proper direction by a blow from the mallet, by roquet, ricochet, concussion or croquet, or roquet-croquet. To pass a bridge, the ba must be clear of it. If a ball after having passed throug a bridge strike any obstacle and rebound back aga through the bridge, the passage has still been effected. from a blow of the mallet the ball strike any obstacle : rebound through its proper bridge, the passage is effect

The Stakes.—The head-stake can only be struck 1 ball that has completed the half round; but if such strike it either from a blow of the mallet, from a ricochet, concussion, croquet, or roquet-croquet, th

ing is effected. In like manner a ball that has passed all the bridges may be struck out against the foot-stake by a blow of the mallet, by roquet, ricochet, concussion, croquet, roquet-croquet, or by flinching from under the foot of the player in the act of croquet.

Roquet.—The player's ball can roquet another from a blow of the mallet, by rebound from a stake, bridge, or other fixed obstacle, but must make another point before it can roquet the same ball again. The roque'd ball remains at the place to which it has rolled, subject to croquet.

Ricochet can only be made by a ball that has already made roquet or ricochet on another, and is subject to the same rules as roquet.

Concussion.—When a ball has been displaced by concussion, it may be played from the spot to which it had rolled, and is not subject to croquet.

Croquet can only be performed by a ball which has previously roque'd or ricoche'd the ball it croques; it may be declined, and the play continued from the side of the roque'd ball. A ball having made ricochet on several balls, may croquet all or any of them, if it is done in the turn in which they were ricoche'd, but may decline.

Roquet-croquet.—This can only be made by a rover, and can be made on every ball in the game, but only once in each turn of play.

Messrs. Jaques and Son of Hatton Garden, London, were among the first makers of croquetry, and from them all the implements *can be purchased*.

PART SECOND.

IN the first part of this book I have endeavoured to direct my youthful readers how to play games out of doors, and I hope that while its perusal will instruct them about the variety of amusements available for open air enjoyment, they may also be imbued with a determination to take their parts fairly, and with a manly, open, give-and-take spirit, thus avoiding all unseemly disputes, and satisfying their own consciences. The second part is devoted to in-door amusements, specially adapted for those days which, in our uncertain climate, make out-of-door exercise undesirable.

PART II.

HOME AND IN-DOOR AMUSEMENTS.

It is always a good thing for boys to have plenty to amuse them at home: a few live pets, or a workshop and some tools will afford this. It is bad on rainy days for them to be entirely dependent on books or in-door games. There is more mischief done at school and at home in wet weather than at any other time. Boys who in their leisure hours have nothing to interest or amuse them soon lose all relish for work; they hang about listless and indifferent in the play hours, and have nothing to look forward to when school-work is over. By all means, let boys who want to live a good, fresh, hearty life, have something definite to occupy their attention when they cannot go into the fields or playground. Those who keep animals of any kind will mostly find something to employ themselves with at such times. The hutches of the rabbits will want attention; cleaning, mending, or painting; the trays of the silkworms will want renewing, or the cocoons winding off, or the eggs hatching. *Or, again, if a boy is of a mechanical turn and*

have a box of tools and a workshop, how many things he can make!—boats, cross-bows, partitions for his desk, boxes for his letters, wooden bricks for his little brothers and sisters, or even a doll's house as a present for his sister. Of course, if he be entirely selfish, the number of things he can make is much less. Chemical experiments, when managed with care, are very interesting, and those which we have given are attended with little or no danger. We will give a few practical directions first for keeping live pets.

HOME PETS.

AT the commencement of this article, I am anxious to warn my young friends, and all who intend to keep pets in confinement, of the *continual* care they will require. They are kept in confinement for your pleasure, and are entirely dependent on you, not only for the cleanliness of their habitations, but for the *regular* supply of food, and all that is necessary for them—I repeat it, the *regular* supply. Rabbits, squirrels, &c., should be fed at least twice every day, and as nearly as possible at the same hours. If this rule be adopted, you will soon become so habituated to its performance, that you will be in less danger of neglecting your pets. I have seen boys and girls lamenting over the death of their pet rabbit or pet *bird*, when themselves have been the cause of death; *the poor* little things having died from the effects of

hunger. This is barbarous: it would be better to give them away, sell them, or even kill them at once, than let them perish from neglect and want of food or necessary care.

RABBITS.



THOSE of my readers who intend to keep rabbits will do well to provide proper abodes before procuring the animals; and as I would recommend the young fancier to begin with keeping common rabbits, he may make hutches for them himself. A tolerable hutch for a doe may be made out of an old egg-chest, which may be bought for a trifle at a cheesemonger's: this and all other rabbit hutches *should have an aperture running the whole length of the*

back, to let out the moisture. The bottom of every hutch should be planed smooth; that for the doe should have a partition with a round hole in it, large enough for the rabbit to pass through, and tinned round the edge, placed about ten inches from one end, with a slide to close this hole when necessary; and the portion so partitioned off should have a *door* (not a grating), opening on two hinges fixed to the end of the hutch, and fastened with a strong button or hasp. The other, or feeding portion, should be fitted with a wooden frame-work, extending the whole remaining length of the hutch, and from the top to within three inches of the bottom, and hung to the opposite end of the hutch by two strong iron hinges, and fastened with a separate button or hasp: this frame-work should have strong iron wires about three-quarters of an inch apart, either driven through or fastened to the frame-work: under the frame-work a drawer for the food, tinned round the edges, should be run in, and fastened on the outside with a strap or button. Hutches for weaned rabbits do not need a partition; neither do those for the buck. For the latter, procure a tea-chest (grocers will always sell them cheap); make a frame of strong wood to fit the front, leaving a space of about two and a half inches along the bottom for a drawer. See that there are no cracks in the chest at which the rabbit can gnaw. An aperture should be left along the floor at the back to let the moisture run off, *but this* should be tinned at the edge; and in order to prevent the wet soaking into the floor, all hutches should

be slightly tipped up at the front. A good size for a buck's hutch is twenty inches high by thirty broad. The frame should be fitted with *strong* iron rods, or the buck will tear them with his teeth, and the hinges by which it is fixed to the hutch should be of stout iron. The drawer also should be tinned at the corners. This tinning is to prevent the rabbits gnawing the wood-work, which they are apt to do.



THE COMMON DOMESTIC RABBIT is too well known to require minute description. They are of various colours. Some prefer the hare-coloured, some the white, the black and white, or the white mottled with black and yellow: the latter are preferred for the table. The grey and black variety have more of the flavour of the wild species. Short-legged, stout-bodied rabbits are considered the most healthy. The French rabbit, with long white silky fur, formerly so great a favourite, is now almost overlooked, and little *more thought of than the common variety*.



The LOP-EARED RABBIT is most prized by fanciers, as much as twenty guineas having been obtained for a perfect lop-eared doe. The requisites for a perfect lop-ear are, that the ears be long and quite equally lopped, falling close to the face, with the tips pointing downwards, and the outer or convex portion of the ear showing to the front. The dew-lap, which is only seen in fancy rabbits after they have attained their full growth, adds materially to their beauty in the eyes of a fancier: this is a protuberance which, commencing under the chin, extends down the throat to between the fore-legs; it is divided in the centre, and when the animal's head is in its natural position, the dew-lap projects beyond it, and appears at the sides of the head in shape something like two eggs. Colour is the next requisite. Tortoise-shell is considered the best, though some think mouse-colour equally good; then pure white with red eyes is next esteemed; afterwards, fawn, or fawn and white or grey; black and white are the next best colours; and, lastly, grey, which is considered the worst of *all* colours for a fancy rabbit: indeed, a grey lop-ear is hardly considered a fancy rabbit at all.



The HORN-LOP is shown above: in this variety the ears fall forward and outward, and although the rabbit may be perfect in every other respect, it is not considered so handsome as a *perfect lop*. Does of this kind, if perfect in dew-lap, markings, and symmetry, will frequently bring forth one or two perfect lops in a kindling, especially if the buck be handsome.

THE OAR-LOP.—In this variety the ears stand out in a nearly horizontal position, somewhat resembling a pair of oars, from which the animal derives its name. The best-bred fancy bucks frequently carry their ears in this position, occasionally varying it by having one ear raised. There are also many excellent does with the same peculiarity, which (if they are perfect in other ways) will produce very good rabbits.

The HALF-LOP is another variety, which is considered less perfect than those already enumerated. The half-lop, as the name imports, has one ear raised and the other drooping, sometimes awkwardly, over the shoulders. This lessens *their value as fancy rabbits*; for it must be borne in

mind that the farther the animal is removed from a *perfect lop*, the less valuable it is accounted. These, like the preceding, will frequently produce one or two perfect lops. Some fanciers who breed rabbits simply for profit will fasten a piece of lead to the upright ear of a half-lop in order to bring it down like the other; but this practice is to be reprobated as being contrary to nature, and calculated to cause the animal considerable pain.



The ANGOLA RABBIT is esteemed for its long broad pendant ears, and for the fine development of the dew-lap, as seen in the animal represented. This rabbit is a native of the Western Coast of Africa, and when kept in this country, requires more protection from the cold than the more hardy breed.

The ANGORA RABBIT demands a notice in consequence of the similarity of its name to the preceding one. Its ears are short and erect, and its fur long and flossy. It is a native of Angora, or Ancyra, in Asia Minor.

The success of the rabbit fancier depends almost entirely

on the care, judgment, and skill displayed in feeding his stock. In a state of freedom, rabbits live on almost every kind of vegetable food not of a poisonous nature, and then they are not restricted in the exercise they take. When they are kept in confinement, they should be fed at least twice a day—first as early as possible in the morning, and again about five, or not later than six, in the evening. Care should be exercised in regulating the quantity of food: thus a doe with young ones suckling will require more food than when she has none, and her food should be of a more juicy nature, and varied in kind. Vetches, lettuces, celery, clover, tares, sow-thistles, dandelion, carrots, turnip-tops, cabbage-leaves, the leaves and root of white beet, parsnips, or the leaves of chicory, are all favourite articles of food, and any of these may be given—but sparingly, as too much moist food will make them pot-bellied. In summer, when green food is plentiful, and the easiest to obtain, many rabbits are lost for want of a mixture of dry food: at this time they should have a little fine hay, bran, oats, oatmeal, or split-peas, in small quantities, given to them each time they are fed. In winter, and occasionally in summer, a boiled or roast potato may be given. You will soon find out that rabbits prefer green food before dry; but the latter is requisite for their well-being. Occasionally no green food is to be had; it is then necessary to moisten the dry food with water, milk, or tea-leaves well squeezed, of which latter they are very fond, but *they must be given sparingly*. As a rule, never give green food that is wet; this tends to give the rabbits

the rot. Do not feed too largely: then they become disgusted with the food and waste it. Feed regularly, and keep the hutches perfectly clean: to do this you will require a hoe and a short broom.

If judiciously fed, kept clean and free from damp and draught, does will breed all the year; but they are much more likely to produce fine healthy rabbits if they are restricted to five or six kindlings yearly. The buck and doe should not be left more than ten minutes together at one time. The period of gestation is thirty days, and the number of young at one kindling varies from two or three to twelve. The fewer there are, the better chance of being fine strong rabbits; and, therefore, many breeders will not allow a doe to suckle more than five or six, either destroying the more weakly ones, or, if all be strong alike, distributing a large kindling among other does that have a lesser number of their own; and to render this possible, they arrange to have several does kindle about the same time. The doe, when she is with young, should be kept by herself in a hutch having a dark portion: should she show symptoms of weakness after kindling, bread soaked in milk, and squeezed nearly dry again, or a malt mash, or scalded oatmeal, will be of service to her. The buck must not be allowed to get at the young rabbits, or he will probably destroy them. If the doe destroys her young, it is best at once, however handsome she may be, to fatten her for the table. The *old rabbits* should not come together again till the young ones are five or six weeks old; in about a fortnight after,

the young may be removed. Those intended to breed from should always be selected from a small litter, as they will be more likely to produce strong rabbits.

Rabbits may be kept in a generally healthy state by good food regularly given, fresh air, and perfect cleanliness. When green food is given it should be fresh; when dry, it should be sound, and not sour. Pot-belly is caused by want of exercise and excess of green food; the remedy is to give all the food dry, very little water, and allow a little exercise if possible. Looseness may generally be cured in old rabbits, but seldom in young ones; the remedy is dry food. Snuffles are caused by cold and damp; in this case the hutches must be kept very dry, no green meat given, and only a small quantity of milk and water instead of water. Boiled potatoes, mixed with bran or barley-meal to a stiff paste, may be given, and, as the disease abates, a little clover or fresh hay. Liver complaint is deemed incurable; rabbits attacked with it should be removed to a hutch by themselves, and, if possible, made fat for the table. The more you vary their food the sooner will the rabbits become fat.



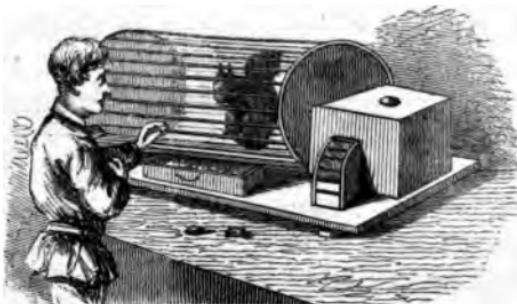
SQUIRRELS.



THERE are few pet animals which better repay care and attention bestowed upon them than the squirrel. Though naturally timid and wild, he soon becomes mesticated and familiar, and displays considerable affection for his protector. In purchasing a squirrel, care should be taken to select a young one, as the old ones are neither so handsome nor so easily taught. An old squirrel, like an old horse, may be known by its teeth, which are large and of a yellow colour. Though the squirrel is not so intelligent a pet as the dog, he may be taught many pleasant tricks, and will soon learn to recognize his name, *come* when called.

In a wild state they inhabit the woods; and it is a pleasant sight in the bright summer-time to see them bounding

from branch to branch, or to watch them scamper up the trunk of the tall tree till they gain the topmost boughs.



It is best to purchase a cage; some are made to revolve; and though these may afford more pleasure to the proprietor, it is scarcely likely they will be equally agreeable to the inmate, since it cannot even change its attitude without putting the wheel in motion. I have seen a cage made with circular top, fitted with a sliding drawer, and tin vessel to contain food: this has a small sleeping box placed at one end, with a hole just large enough to admit of ingress and egress, and provided with a slide to close or open it at pleasure. The sleeping place should have a supply of hay, moss, and wool for the squirrel's bed, and as these little animals, when at liberty, are remarkably cleanly in all their habits, great care should be taken to keep the cage perfectly sweet and clean: to do this it must be cleaned out daily, and the bottom of the cage sprinkled with sand or fine gravel. The natural food of

the squirrel consists of nuts, preferring the filbert, the hazel-nut, the walnut, the chestnut, or acorn; and these, or such as can be procured, should be its food in confinement, with the addition of a little bread, or bread and milk, occasionally: care must be taken that the food is not sour.

The nest of the squirrel is generally formed among the large branches of a spreading tree, where the branches begin to fork off into smaller ones. It is made of moss, hay, twigs, and dried leaves, and is very roomy and soft. Sometimes it adapts an old crow's-nest; but on these occasions it makes considerable alterations, both inside and outside. If squirrels are kept for breeding from, it will be necessary to supply the female with some additional wool a week or so before the expected increase, which she will make use of as she requires it. Squirrels produce their young once a year, generally three or four at a time.

GUINEA PIGS.

THESE little animals, of which some boys are so fond,



were originally brought from Brazil, but have become quite acclimatised in this country.

They are extremely neat and clean, and spend much of their time in cleaning and smoothing each other's fur: indeed it is stated that if the young ones chance to get dirty, their mother takes such a dislike to them that she will not suffer them to

come near her. They are very prolific, commencing to breed at about ten weeks old, and producing from six to twelve at a litter. The males sometimes destroy the young: indeed, these animals seem quite destitute of affection. They will do best if kept in small hutches, will eat anything that rabbits will eat, and seem to prefer tea-leaves to all other food—but their food should be varied.

SONG BIRDS.

It is said that though British birds have not much to boast in the way of plumage, they are unrivalled for song. For uncouth sounds, resembling those of beasts, the Australian birds will perhaps carry the palm. But whoever had the good fortune, on the evenings of the glorious summer of 1864, to be in the country, and especially the more woodland parts of it, would hear such melodies and choruses as gladdened the heart.

Among the foremost, loudest, and not least melodious of these is

THE THRUSH.

Within a thick and spreading hawthorn bush,
That overhung a molehill large and round,
I heard from morn to morn a merry thrush
Sing hymns to sunrise while I drank the sound.

CLARE.

The powerful melody of this fine bird is heard from a great distance, and is always a welcome sound. It has a

spotted breast and brown back, and if sometimes it gets a bad name for robbing orchards, the number of snails and caterpillars found in its crop more than compensates for the mischief.

In confining this bird to a cage, regard must be had to its size in the structure of its prison, and to the power of its voice as to locating it. It would be intolerable in a room, while the free air would both conduce to its enjoyment and promote its vocal efficiency. The thrush feeds on insects, berries, and snails, breaking the shells of the latter against a stone. In confinement, lean meat cut very small, and mixed with bread, or oatmeal moistened with milk, may be given. These birds require a sufficiency of fresh water, both for bathing and drinking.



THE MISSEL THRUSH.



The MISSEL THRUSH is remarkable for the sad wildness, as well as the strength of its note. It is called also the storm thrush, from its gleesome delight in tempestuous weather. Unlike most other birds, it does not leave us in the winter for some sheltered nook, but carols out its notes in the cheerless months of December and January. It requires the same food and treatment as the song thrush.

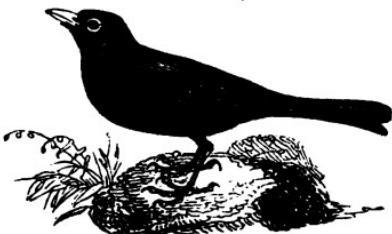
THE BLACKBIRD.

The blackbird whistles from the thorny brake,
The mellow bullfinch answers from the grove.

THOMSON.

The note of this bird, though mellow and cheerful, is not equal in melody to that of the thrush; but it is "a ryghte *merrie birde*," and very difficult to catch in its ma-

ture state. The little fledgelings, so familiar to a boy's sight, are the sources whence our cages are chiefly supplied. It is not, however, easy to distinguish between a cock and a hen bird when so young. The cock-bird is somewhat darker than the other.



The boldness of the blackbird in defending its young is remarkable. An instance of this is related by Jesse, a minute observer of their habits: "A cat was observed on the top of a paled fence, endeavouring to get at a blackbird's nest which was near it; the hen left her nest on her approach, and flew to meet puss in a state of great alarm, and placed herself almost within reach of her claws, uttering the most piteous screams of wildness and despair. The cock-bird, on perceiving the danger, showed the greatest distress, and uttered loud screams and outcries, sometimes settling on the fence just before the cat, who was unable to make a spring, in consequence of the narrowness of its footing. After a little time the cock-bird flew at the cat, settled on her back, and pecked her head with so much violence that she fell to the ground, followed by the black-

bird, who succeeded in driving her away." Though the attack was renewed more than once, the bird was victorious.

The blackbird may be taught to whistle a tune which is frequently played on a flute.

The natural food of the blackbird is similar to that of the thrush; it is also fond of cherries, plums, &c. In confinement use the same food as for the thrush, giving the oatmeal and milk only occasionally, and remembering its taste for ripe stone-fruit in season.



THE SKYLARK.

Th' example of the heavenly lark,
Thy fellow-poet, Cowley, mark.

COWLEY.

Who that has escaped the smoke of the city has not been enraptured with the song-flight of the lark rising—rising, and carolling as he rises, in the blue sky? When

the bird has become the merest speck, and even lost to sight, his cheery note is heard, as if on his way to heaven to do homage for his being and enjoyment.

From peculiar marks on the eggs, resembling scratches of writing, this bird is sometimes called the "writing lark." We feel almost ashamed to say that larks are considered dainty eating. It is worse than the "four-and-twenty blackbirds baked in a pie." Few sights are more revolting than that of the prowling knaves, with their long baskets strapped to their backs, unbuckling, bringing out their decoy-birds, lying on the ground watching, like so many huge cats, to spring upon their prey when lured from their heights by the promise of social companionship, and to see the miserable little wretches "cribbed, cabined, and confined" in a cage scarcely large enough for a mouse, in which they are confined by scores piled one on another waiting for purchasers. Yet it is wonderful how soon after removal into a decent apartment they appear reconciled to their lot.

Skylarks build on the ground, selecting the furrows in pasture and corn-fields as the site of their nests. The hen lays from three to five eggs, on which she sits a fortnight. When it is desired to take young birds from the nest, they should not be allowed to remain after they are ten days old; they should be placed among clean fresh hay, kept warm, and fed moderately every two hours with white bread and bruised rape-seed moistened with warm milk, but quite sweet: in two or three days a little fresh

meat, cut very fine, or a few ants' eggs may be given. In about ten days they may be removed into a cage, which must have the bottom covered with coarse bran or finely-cut hay, which must be changed every day. When they begin to feed themselves let them have dry food, as bruised hemp-seed, bread, and occasionally a little hard-boiled egg. As they grow stronger they will be able to break the seed, and should have a bit of fresh turf every second day, and the bottom of their cage should be strewed with fresh gravel, which must be frequently changed.

The natural food of the lark is insects of various kinds, but it takes kindly to a vegetable diet in part, such as seeds and the tender blades of grass. The turf-cutters, who go far into the country to bring home fresh growing grass, are among the best friends of the captive lark.



THE WOODLARK

Resembles the skylark in many respects; but its body is shorter and thicker. Its notes are loud and very full of

melody; but it is a timid bird, and will seldom sing in the presence of strangers. In a state of freedom it sings as it flies, and rises to such a height in the air as to seem a mere speck, where, with wings and tail expanded, it remains stationary, and pours forth such a flood of melody as enraptures the listener.

Nestlings should be reared in the same manner as described for skylarks. Great attention must be paid to cleanliness in both instances; the woodlarks being subject to a disease in their feet, which renders them so brittle that the toes snap off. Perfect cleanliness is the only preventative.

The natural food of the woodlark is, in early spring, the young buds of various herbs; in summer, insects, worms, and seeds; in autumn, principally seeds, as oats, rape, millet, or poppy seeds. As he is a delicate feeder, it will be necessary to vary the food occasionally. When first caged he should be fed with ants' eggs and poppy seeds, strewn at the bottom of the cage. When he becomes accustomed to confinement a trough may be used, and any seeds given him, when they are green, as hemp, oats, wheat, and occasionally a meal-worm or two, or a little finely-cut beef, &c.



THE LINNET.

Mark how the lark and linnet sing—with rival notes,
They strain their warbling throats, to welcome in the spring.

DRYDEN.

The linnet is a general favourite, perhaps nowhere more esteemed than in Germany. He is not, however, unappreciated in England; for his song is sweet, though his coat is unpretending and modest, and he will “pipe up” when feebleness or age will often render other birds silent. His notes are a marvellous compound of sounds delivered with a sudden “staccato” movement.

There are varieties of this bird denoted by their colour, as green, brown, yellow, grey, &c.; these colours, however, do not indicate different kinds of birds, but different periods of growth.

The food of the linnet consists of various kinds of seeds, such as *rape*, *flax*, and *poppy*, occasionally mixed with

moistened bread. Rape-seed does not agree with them in winter for a long period, and poppy-seed, with a little salt, should be given. They must not be fed too plentifully, or they will grow fat and soon die.

Linnets are sometimes troubled with a swelling at the rump ; when this seems nearly ready to burst it should be opened with a fine needle ; after it has discharged anoint with fresh butter, and for a few days give lettuce seeds and leaves, and put a little saffron in his water. He is also subject to a looseness or scouring, the worst form of which is when the dung is white and clammy. He should then be fed *entirely* on flax seeds, *green* plantain seeds, or the leaves cut small, and a small quantity of bruised hemp-seed with a little chalk, saffron and liquorice in his drinking water.

THE CANARY.

Poets, so lavish of their apostrophes to all other feathered songsters, seem to have overlooked this elegant little bird, which, though a denizen of a warmer climate, has become naturalized in England, if we can apply that term to a bird that is never seen out of doors. So common have they become that we, on seeing a cage, more often look for this as its inmate than for those exhibiting more variety of plumage. The song of the canary is very sweet, and is generally instigated by making a chirping or whistling noise. A canary that has been silent for a length of time *will often suddenly break out when conversation begins,*

and so pertinaciously continue as to render some defensive measure, such as spreading a handkerchief over the cage, necessary.



In choosing a canary, take the brightest, boldest-looking bird, one that stands well upright, with clear eyes, and be sure you hear him sing in a separate cage before concluding your purchase, as the notes of these birds vary considerably. Should you desire to breed canaries, a breeding-cage will be necessary, which should be furnished with two boxes for the hen to build in (as she will frequently produce a second brood before the first are fledged), and materials for the nest, which consist of moss, fine hay, wool, and feathers, and may be bought at any bird-fancier's in a little net for hanging up in the cage. Select the strongest birds for breeding: put a cock and hen together in a

small cage about the middle of March, and when they seem familiar remove them to the breeding-cage. The nest will be built in four or five days. The hen lays from three to five eggs, on which she sits fourteen days. When pairing, and when they have young ones, give them hard-boiled egg, cut small, bread, maw-seed, and a little scalded rape mixed; occasionally let them have a few leaves of the cabbage-lettuce and chickweed seeded; in June, give them shepherd's-purse; and in July and August, plantain seeds. When the young birds can take their own food place them in separate cages, and give them a mixture of the yolk of egg, boiled hard, scalded rape-seed, and a little white bread, with a small quantity of maw-seed added, which should be fresh every day. After they have moulted they may be fed as old birds, on rape and canary seeds. Let the breeding-cage be placed to catch the rays of the morning sun, and when the weather is warm the window should be opened to give them fresh air. Much depends on perfect cleanliness and keeping the cage well supplied with clean, dry, and fine gravel or sand. The canary is melancholy when moulting, and requires to be kept warm. Let him be in the sun when it is hot; feed him with nourishing food, and put saffron or liquorice in his water.

The diseases of the canary are the *pip*, which is a little pimple near the vent, which should be opened with a needle, and, after it has discharged, have a little wet pounded loaf-sugar applied: the yellow scab, which appears

on the head and eyes, and should be anointed with a little fresh butter or lard: the *surfeit*, which is caused from cold or from eating too much green food, and, unless promptly attended to, will prove fatal. In this disease the belly is swollen, and full of little red veins. Put a little oatmeal among the seed to cleanse him, and keep him warm for two or three days.



THE GOLDFINCH.

Time was when I was free as air,
The thistle's downy seed my fare,
My drink the morning dew;
I perched at will on every spray,
My form genteel, my plumage gay,
My strains for ever new.—COWPER.

The goldfinch is one of the very rare specimens of British birds which combine rich and varied plumage with choice powers of song, *in which it rivals the canary*.

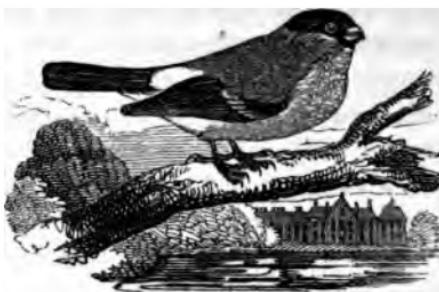
accomplishments so utterly antagonistic to their :
We cannot forbear, in the interests of humanity
making the following extracts from Beeton's adn
work on the " Management of Home Pets ":-

" A few years ago, before that annual abomi
Greenwich Fair, was abolished, I scraped an acquai
with an old (and penitent) circus-master, and togetk
visited the wretched abodes of every performing Ch
and beast we could find ; and in every case it was the
for all, from the poor spangled little children who r
delighted large audiences in their ' drawing-room ent
ment,' to the lean and learned pig, there was b
schoolmaster—appalling and unsparing cruelty !]
incontrovertible fact, that it is impossible to teac
animal to perform feats distasteful and foreign to its :
without resorting to violent and unnatural means.

that spins round in the wire cylinder, and sets the wind-mill going, received his lessons in a cylinder, the wires of which were made *so hot* as to compel him to keep up a tortured dance to save his poor toes from scorching! That the little creature that stands unmoved amidst the squibs and Catherine-wheels, has had his eyes scaled by the near approach of hot iron, so that, although he appears to have his sight, he is quite blind, and cannot see the glare of the fireworks, and does not flinch from the noise of the exploding gunpowder, for the simple reason that a pistol has been discharged so often near his ears, that he is nearly deaf!"

Canary and rape seed may be used for food for the old birds; for young ones, bread and milk, with bruised seeds. A little green, such as lettuce, chickweed, endive, or watercresses, will be of use, occasionally.

Goldfinches are healthy birds, and, with moderate care as to cleanliness and proper feeding, less likely to get out of order than many of our caged favourites. Should your pet be attacked by epilepsy, which is caused by feeding with too much hemp-seed, remove the seed and give him lettuce or thistle seed instead. Put saffron in his water, and if he is much scoured mix some small pieces of chalk in his food. Should his eyes become weak and swollen, anoint them with well-washed lard or fresh butter.



THE BULLFINCH.

The bullfinch, like the blackbird, will readily learn tunes and sing delightfully, and the process of teaching need be nothing more cruel than an appeal to the stomach, which "cuts two ways:" for if an empty stomach is the best preparative for the lesson, a full one is its best reward; and it would not be easy to find a biped or quadruped in which an appeal to the stomach is not an effective stimulus to worthy deeds, and often a direct road to the heart.

The plumage of the bullfinch, though not equal to that of its golden congener, is very rich, and his black head-piece gives him a dignity and bearing wanting in the goldfinch. His portly person, moreover, is not to be despised.

The natural food of the bullfinch is seeds, corn, and various berries. He will thrive well on rape-seed that has been soaked in water for eight hours; and a little green

food, such as chickweed, watercresses, or lettuce, or a little hemp-seed, may be given occasionally. The bottom of the cage should be kept strewed with clean river-sand, and when the bird is moulting put a clove in his water.



THE CHAFFINCH.

Though not very celebrated as a songster, the chaffinch has a cheerful and amusing note, and is a lively little fellow. He has withal gained the reputation of being a good architect. The mosses with which he covers his nest show exquisite, not to say poetical, taste and great skill, while the lining shows that he has an eye to comfort. In the construction of both outside and in, there is no doubt that feminine skill, if not predominant, largely contributes.

The chaffinch, when at liberty, varies his food according to the season : he feeds on insects in spring and summer, and on seeds and grain in autumn and winter. In confinement, soaked rape-seed is the general food ; but in spring a little hemp-seed should be given, which must be placed

in a separate drawer at the opposite side of the cage to the rape. Too much hemp-seed sometimes causes blindness. In winter, or when moulting, meal-worms, or ants' eggs, may be given occasionally. Let the cage have a bathing-pan, always supplied with fresh water, or the bird will become diseased. A little saffron or a rusty nail should occasionally be placed in his drinking water, especially if he be dull.



THE NIGHTINGALE.

O Nightingale! that on yon blooming spray
 Warblest at eve, when all the woods are still;
 Thou with fresh hope the lover's heart dost fill,
 While the jolly hours lead on propitious May.

MILTON.

This queen of all the songsters is not generally to be heard in the vicinity of large towns. During the summer of 1864, one of these birds uttered its nightly solo within a mile or two of Birmingham, and such throngs of listeners were drawn to the spot from this iron metropolis,

that the owner of the ground was compelled to shoot the charming songster in self-defence ; his grounds being trespassed on, his crops trodden down, and his shrubs and trees wantonly broken. Men of hardest mould will go miles to hear the nightingale : pity it is that there is not more power to soften and civilize rude natures than the above incident would indicate ! It would be useless here to attempt a description of his note ; but all agree that it is the climax of melody. The appellation of the "Swedish Nightingale," bestowed on Jenny Lind, was as great a compliment to her vocal excellence as could be paid.

Ants' eggs, or ants killed with hot water, may be given to the nightingale ; but it is difficult to keep this bird in captivity ; and so long as his note can be heard in his native groves in the silence of the night, it seems hardly worth while to subject one's self to almost certain disappointment, and the poor sensitive bird to wretchedness.

THE ROBIN.

Up a grove did spring green as in May,
When April had been moist : upon whose bushes,
The pretty robins, nightingales, and thrushes
Warbling their notes.—SUCKLING.

Pope, lamenting the degeneracy of the age, says—

"The robin-redbreast till of late had rest,
And children sacred held a martin's nest."

Whether the present age is an improvement on the eighteenth century *in the matter of humanity to birds in general*,

and to robins in particular, we cannot venture an opinion; but we think on the whole the redbreast has not much to complain of, and that many a bird of as good, if not better, moral qualities might be willing to make an exchange. We see little enough of him except when cold and hunger (effective teachers) make him sociable.



The song of the robin, though feeble, is not despicable when he really opens his mouth. His plaintive note is grateful to a pensive listener; but the horrid, piercing, single note haunting one from time to time is almost enough to rob one's own breast, if not his, of the peculiar charities that fence round his sacred person. As no one ever keeps robins, no directions need be given in the matter of food, beyond the conventional alms of daily crumbs from the parlour window, where "the smallest contributions will be thankfully received."

TALKING BIRDS.

THERE are many varieties of birds that may be taught to imitate sounds. Some will utter words or sentences more or less distinctly ; others will imitate the sounds of domestic animals ; others, again, may be taught to whistle certain tunes very correctly : of these the PARROT TRIBE, of which there are not less than 170 kinds, are the most universal favourites ; they inhabit warm regions, and abound in Asia, the West Indies, South America, and Australia.



The GREY, or ASH-COLOURED PARROT is, perhaps, best known. It has an excellent memory, and if its education begins when quite young, may be taught to repeat long sentences, and with such *apparent acumen* in the occasional applica-

tion of them, that it seems possessed with a knowledge of their meaning: a fine bird of this species, in the possession of an esteemed friend of the writer, readily distinguishes his knock at the door, and flutters about in his cage till let out to welcome him. Perched on the table, near its protector, it frequently repeats, "All right, father's at home!" and manifests its pleasure in his society in many attractive ways.



The LORIES are among the prettiest of the parrot tribe. There are several varieties, the plumage (which is chiefly red) being of different degrees of brilliancy, and varied with blue, yellow, green and violet. They are lively, active birds, and are accounted the most nimble of all the parrots, but require greater care than others of the tribe, and special protection from draughts and cold. They are very docile birds, easily taught, have good memories, and

will readily learn to whistle tunes that are frequently repeated. The shell lory has plumage of a golden hue with bluish spots: it is a rare bird, of small size, and very affectionate disposition. The variegated lory is much prized: it is about the size of a pigeon; the plumage is very delicate. The blue-capped, or mountain, lory obtains its name from the top of the head being covered with feathers of a dark purple hue: the prevailing colour in this species is a rich maroon, having a band of yellow round the throat. It is very affectionate, pleased at being noticed, and a good talker when taught young.



THE MACAW.—This is the largest of the parrot tribe, and is valued for the brilliancy of its plumage and its distinct articulation. *Macaws* differ from other kinds of

parrots in the nakedness of their cheeks, the great length and curvature of the upper, and the extreme shortness of the lower jaw, and in the form of their tails, which are longer than their bodies, and end in a point. The red and blue macaw is a native of Brazil and the West Indies, and is a magnificent bird. The red and yellow species, though equally brilliant in colour, is inferior in size. The deep blue, and the blue and yellow variety, which inhabit Brazil, are birds of exquisite beauty.



The COCKATOO derives its name from the frequency with which it repeats the syllables cock-a-too. There are several varieties. The yellow-crested cockatoo is remarkably intelligent, and when trained, excels all other

parrots in attachment to those who treat it kindly. With the exception of the crest, the pinion-feathers, and a portion of the tail, which are of a straw-colour, the plumage is entirely white. The great white cockatoo has similar markings, but is larger; it is a native of the islands in the Indian Archipelago. The rose-crested species is still larger, and is a noble-looking bird.



THE PARROQUET, OR PARROKEET.—These are the smallest of the parrot-tribe, and are distinguished by the greater length of their tails and the delicately soft colours of their plumage. There are many varieties seen in this country, *where they are usually kept in pairs, and become*

exceedingly attached to each other, so that if one dies, the other will pine away unless speedily supplied with another companion.

Parrots should be kept in large roomy cages ; it is quite a mistake to suppose, as some do, that they will sooner learn to talk if kept in a small cage. Perhaps the most convenient form is the bell-shaped, which is commonly furnished with a ring suspended from the top, in addition to perches, which latter, by-the-way, should be made thicker in the middle than at each end, so that the bird's feet may not be cramped by always having to grasp a rest of the same thickness. Cockatoos are generally kept chained to a perch, as shown in the illustration, but with the addition of a food and water box at each end.

Parrots thrive best on grain of different kinds, and occasionally bread soaked in scalded milk. Biscuit and lump-sugar they will eat readily, but the latter must be given sparingly. Meat, pastry, or anything of an oily nature must never be given : many a fine bird has been lost through injudicious kindness in this respect. Be careful that your parrot always has a supply of clean gravel ; this is indispensable, as the small stones assist digestion. The receptacles for food should be glass or earthenware, being more easily cleansed than tin. Copper, zinc, or brass should never be used, as they become poisonous.

By a due regard to temperature, cleanliness, and warmth, parrots may be kept in good health. In cold, damp

weather a few chillies, cut into small pieces, may be given at intervals of twenty or thirty days.

Parrots are subject to attacks of inflammation, the symptoms of which are that the birds become dull and inactive, drowsy in the morning, and sit moping on the perch; the cause is to be found in exposure to cold draughts, sudden changes in the weather, or from the cage being left uncovered in the night. This disease may sometimes be cured by adopting the following diet:— Mix whole grits, well-boiled, with the hard-boiled yolk of an egg, and add boiled milk and bread; and give the water in which rape-seed has been boiled for drink; every third day substitute Indian corn. If after a few days' trial the bird does not improve, take away the food at night, and place in the cage about a table-spoonful of water in which a tea-spoonful of magnesia has been dissolved; this should be removed in the morning and fresh food be given.

Some birds, and especially lories, are subject to attacks of epilepsy, arising from the want of exercise, and excess of quantity or richness of food: when the fit comes on, the patient should at once be taken out of the cage, theak opened, and a few drops of water put in; it should n be plunged into cold water: if this does not restore it, w one of the tail-feathers, or, when the operation can skilfully performed, one of the veins of the feet may be tied. The bird should be kept warm, more nourishing given, a few drops of nitre added to the water, and a drops of olive oil administered.

There are several birds, natives of our own country, which may be taught to utter words with more or less distinctness ; they are also objects of special interest from their curious ways and the tricks they learn when domesticated. When the writer was a boy, he well remembers with what sorrow and indignation he witnessed the slitting of a jackdaw's tongue, which was done with the idea that it was necessary before the bird could be taught to speak. Let me caution my readers against the uselessness and cruelty of such a barbarous custom. If you have a pet of this kind, talk frequently and cheerfully to it, and it will soon learn to imitate your voice with such ease as nature allows ; more than this it cannot do.



The RAVEN, as the largest of the British talking birds, deserves notice first. He is of a bold, hearty disposition,

and from the great breadth of his tongue may, if taken and taught young, be made to utter words very distinctly. A full-grown raven is about two feet in length, and his whole plumage is of a shining black, glossed with deep blue. The natural food of these birds when at liberty is dead animals, and such living ones as they can destroy, as young rabbits, mice, birds, snails, and various kinds of fruit; indeed, anything that comes in their way. In confinement they may be kept on broken meat, or bread and milk; but they are gross feeders. The character of the Raven is thus summed up by a writer on Natural History: "He is active, curious, sagacious, and impudent; by nature a glutton, by habit a thief, in disposition a miser, and in practice a rogue."



The JACKDAW, which wears a coat of the same colour as the raven, is very considerably smaller, being only about thirteen inches in length. These birds may be taught to pronounce several words very distinctly, but, like all crows, *should be taken young*. Jackdaws are very

cunning birds, and have a strange propensity for picking up and hiding anything of a bright or shining nature; in some instances much mischief has been caused by their pilfering propensities, suspicion having fallen on the innocent, while master Jack was the *real* depredator. In its wild state the jackdaw lives on snails, grubs, worms, insects, and nuts of various kinds. Where there is a garden a tame bird will pick up most of its subsistence, only requiring an occasional feed of bread or broken meat.



The MAGPIE is a handsome bird, black being the prevailing colour of its plumage, beautifully glossed with changing tints of green and purple; the lower part of the breast and part of each wing is white. It is a very teachable bird, and can be taught to imitate musical sounds and the human voice almost as well as a parrot. *The magpie feeds on everything wholesome—worms, insects, seeds, and also small birds when they come in*

his way. In confinement he will eat bread and milk, cheese, meat: like the raven and daw, he is fond of hiding away any small glittering object he may pick up. He displays great cunning and dexterity in the construction of his nest, which consists of small twigs platted together and lined with fibrous roots. Young birds intended to be tamed should be taken from the nest when they are fourteen or fifteen days old. When sufficiently fledged it is best to let them fly to some tree near to their future home, and then entice them back again until they have become familiar, and they will frequently return home after enjoying a few hours' liberty. When full-fledged their pinion-feathers should be cut shorter; they will then seldom stray far away.



The JAY is one of the most beautiful of British birds; his back and breast are of a delicate cinnamon colour, his wings handsomely chequered with black and white; on his head is a tuft of white feathers streaked with black, which he can erect at will. The jay's nest is found in high

are of a lightish brown spotted with a darker hue. taken young, the jay may be taught to talk, and will imitate sounds in so exact a manner as to mislead unwary. Gardeners are sworn foes to the jay, as, from fondness for fruit, he does great mischief to their gardens. He is also very fond of eggs, and is quite an adept at finding birds' nests, occasionally making a meal of the young birds. On account of his apparent partiality for the eggs of the partridge and pheasant, gamekeepers consider him among "vermin," and he shares their fate. I have found him to be very tame and may be kept principally on wheat, with occasional additions of nuts and acorns. Young birds are best reared on bread, biscuits, curds, and meat cut very small; water kept constantly fresh should always be in the cage, and the jay is fond of bathing, and frequently drinks.

may be more easily taught to speak than the jay. The starling is so fond of society that it will readily associate with redstarts and fieldfares, and even with jackdaws or pigeons. In a state of freedom its food consists of insects, caterpillars, fruit, and grain. In captivity its food should



assimilate, but it will eat bread, cheese, meat, or almost any kind of food that is not sour. Like most other birds, a constant supply of fresh water for bathing as well as drinking is necessary to keep it in health.

Birds kept in confinement are subject to many diseases from which they are exempt in a state of freedom. I would have my readers bear in mind that there is considerable cruelty in keeping these and other pet animals in durance for their own gratification, and therefore it is the more necessary that every care should be used to provide them with proper food in sufficient quantity, with plenty of *fresh* water, and to see that their cages are kept perfectly *sweet and clean*. By strict attention to these

matters, disease may, to a very considerable extent, be prevented; and we all know the old adage, that "prevention is better than cure." As some cases of disease will infallibly occur, I now proceed to give a few hints as to the treatment of those most common.

Diarrhoea is a disease to which all birds kept in confinement are subject; it is most frequently caused by improper or sudden change of food. When attacked with this malady, the bird is troubled with frequent evacuation of a chalky substance, which adheres to the vent feathers. The yolk of a hard-boiled egg will sometimes effect a cure: soaked bread and Indian corn, with the water strained from it, may also be given, and the juice of lettuce-seed added. Warmth is also necessary, especially for parrots.

It is to be hoped a great improvement may yet be made in the construction of cages, on which depends so largely the comfort of birds. The folly of confining the freest description of animals in the narrowest possible space is preposterous. It is alleged that they sing better in a small compass, simply because there is nothing else they can do. We greatly doubt the correctness of the opinion, were a fair chance and time given to try the experiment. If, however, it be so, and this be the condition on which we can obtain the pleasure of hearing birds at home, then, in the name of all that is just and humane, leave the keeping of birds to selfish, heartless people, whose only object it is to gratify themselves, though it be at the expense of any amount of suffering. We know a gentle-

man who keeps a neatly-constructed aviary in his living-room, in which fifty or sixty beautiful birds disport themselves, hopping from branch to branch of a tree that reaches to the height of the cage (about six feet). We do not mean to say that this mode of life tends to the culture of their singing powers. It does, however, bring out such an amount of peculiarity of habit, and of genuine enjoyment and attachment, as well reward the owner of this family for the absence of special professional talent. But there is a medium between this arrangement and the life of the miserable little prisoner in a cage of *small* dimensions.

Let every cage, whatever its size, be plentifully supplied with water both for bathing and drinking, and a sliding bottom for cleanliness. Breeding-cages must be on a larger scale than is necessary for single birds; must be furnished with branches in which to build, and a net with hair, wool, or moss, to use in the construction of nests, and the sliding bottom be kept strewed with dry sand or very fine gravel.

PIGEONS.

THESE birds, though they are surpassed by many in the brilliancy of their plumage, yield to none in beauty of form and elegance of attitude. In a domesticated state they are very prolific, and will rear from five to eight broods annually, if kept warm, clean, and well fed.

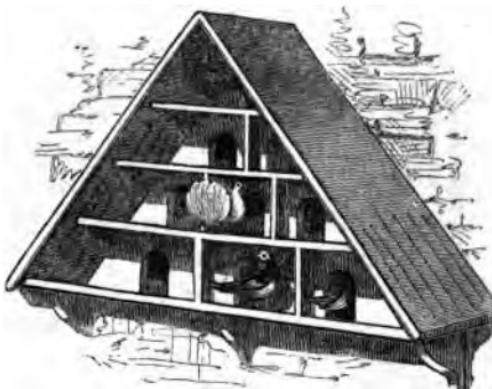
There are few domesticated birds that are greater favour-

ites, or better repay their protectors for the care bestowed on them, being not only pleasing objects to contemplate, but useful as providing a delicate article of food. Though I dare say some of my readers will think the latter a mercenary recommendation, yet I fancy few would object to partake of a pigeon-pie, providing it was not concocted of the bodies of their special favourites.

As with other pets, so with pigeons : before procuring the birds it will be necessary to provide accommodation for them.

The young pigeon-keeper must remember that pigeons require roomy, airy abodes, free from damp, and protected from cats, rats, and mice. Pigeons also require warmth and quiet, so that the house should, if possible, face the south, or the south-west, and should be so placed that they may not be unnecessarily disturbed. The dove-cote or pigeon-house may be of any size or form, according to the number it is required to accommodate, or as it may be convenient to the keeper. For a small number of birds, perhaps, the triangular shape, to be fixed against a wall, is the best adapted, since it does not entail much expense, and can be fixed without intruding on the space required for other purposes, and it allows the wet to run quickly off the roof. Such a box may be made with any number of holes; but (for the sake of that cleanliness which is so essential to the well-being of the pigeons) it *should* be constructed on the principle of a chest of drawers, *that* each compartment may be taken out and thoroughly

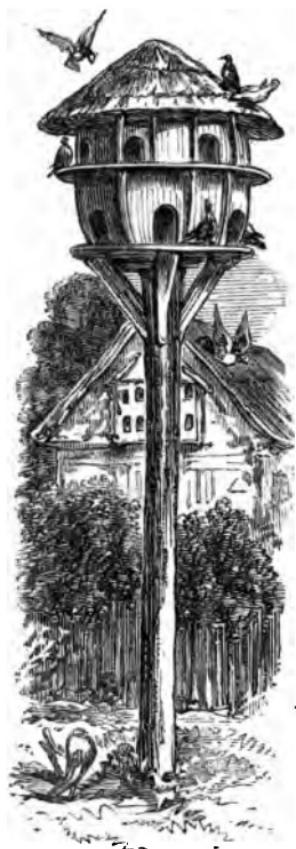
cleansed : indeed, it is best to have the whole box put together in grooves, so that it can be taken entirely to pieces, well scoured, dried, and lime-washed, at least twice a year. The compartments for the pigeons should be a foot square, and have a ledge below the entrance of each of five



or six inches in width, for the pigeons to alight on before they pass inside, and partitions of the same width between each entrance, to prevent the birds pecking each other : the covering boards or roof should project nine or ten inches beyond the entrances ; those at the side may be of the same width as the roof.

When a larger number are kept, a very convenient form of cote, especially adapted to the centre of a court-yard or farm-yard, may be made of a square, round, or octagonal form, *divided into cells*, and furnished with boards for the

pigeons to perch, and with the usual partition between the holes—the whole elevated on a stout pole, and covered with a sloping roof. To prevent cats, rats, &c., from climbing this pole, the bottom part, for about three or four feet, should be cased with zinc, tin, or galvanized iron.



opening made in the roof, provided with a ledge and a fence

These houses are adapted for the common and ordinary-sized pigeons; but where fancy birds are kept greater care and attention is requisite in providing houses for them. Where the number is limited, large cages are sufficient for their accommodation—larger numbers require aviaries, or rooms fitted up and set apart for their use. In towns many persons allot the space between the garrets and the roofs of the houses to the use of their fancy pigeons. To do this it is requisite that the rafters be covered over with a flooring (thin slates are the best, as being most easily kept clean), and an

to protect the birds from cats. Traps are also necessary, to enable the fancier to have proper control of his pigeons. These traps may be made of laths on a frame, square or oblong, with one or two doors hinged at the bottom, falling back, and so arranged that, by pulling a string, they may be closed when the pigeons have entered, one end of the string being held by a person on the watch to secure the pigeons after their flight. One end of the trap may communicate with the loft, to allow the pigeons to enter from the trap; this entrance should be protected by a frame-work, on which is suspended a swinging bar, pierced with two wires, sufficiently apart to admit the head and neck, but not the body of a pigeon. The wires should be long enough to rest against the *inside* of the bottom bar of the frame, so that any bird that remains out after the others are housed may gain an entrance, while those that are within are prevented from getting out.

For fancy pigeons the shelves should be at least eighteen inches wide, and, if you keep pouters or horsemen, twenty inches high, to afford them room to stand upright; otherwise the taller birds will acquire a habit of stooping, which will entirely spoil them. These shelves should be fitted with projecting partitions to run in a groove, about thirty inches apart, and each compartment provided with two earthenware pans, wooden boxes, or straw baskets, to contain the nests of the breeding pigeons, and by the side of each nest a piece of wood or a brick should be placed, assist the birds in getting on to and off their nests: some

fanciers darken the nest on which the hen is sitting by a board placed in front. Of course, every kind of pigeon-house must be provided with accommodation for the nests, and the floor and ledges kept sprinkled with fine dry gravel or coarse sand, not only for the sake of cleanliness, but because the gravel is picked up by the pigeons and assists digestion.

The hen never lays more than two eggs, and there is generally one clear day between the laying of these. She most commonly begins to sit after depositing the first egg, from which time the birds sit alternately for twenty-one days; the hen usually from five o'clock in the afternoon till nine next morning, when she goes out to feed, and the cock takes her place till her return; should that be delayed beyond the usual time, the cock generally leaves the nest, goes in search of his partner, and drives her home; the hen in turn looking him up in the same way should he be inclined to play truant. Instances, however, have been known where the cock has sat for twenty-four hours, when, the hen not returning, he has left the nest, and the eggs have been spoiled. The food of the newly-hatched pigeons is supplied by the parent birds bringing up from their crops food, which is partially digested, and in a pulpy state. As the young grow older, food less pulpy is administered; but they depend on the old birds for food for a short time after they begin to fly.

When the old birds are in perfect health and have plenty of food, the hen will lay again before the young birds of

the previous brood have left the nest, therefore the *two* pans are necessary.

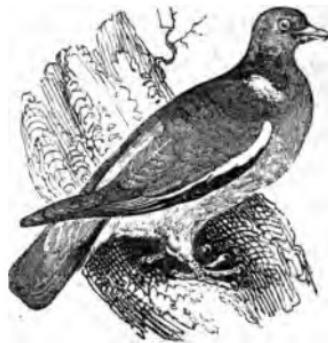
The nest boxes must be kept clean. A clean pan and nest should be provided in time for the hen, and no old nest suffered to remain after the young birds have left it.

Feeding.—If the pigeon-house be in a farm-yard, the birds will be able to procure the greater part of their food: indeed common pigeons generally do so; but it is always best to let them have a supply in or near their house, as by this means they will become more attached to it, and consequently less likely to stray. They will eat any kind of grain or pulse: old tares, when they can be got, are the best; but they like a variety, such as wheat, barley, oats, peas, or *small* tick beans. When pigeons are kept in a loft, several boxes (according to the number of birds) should be provided, in which the food should be placed; also receptacles for water. Proper food boxes, which prevent the food being wasted, are sold by the dealers in pigeons; and proper water-bottles may be had at any earthenware shop.

Pigeons require lime to assist in forming the shell of their eggs, and also to correct the acidity of their stomachs; therefore a few pieces, broken small, should be strewed on the floor among the gravel. They also like salt, a little of which may be *occasionally* mixed with their food.



Though many writers assert that the Stock Dove, or wild wood pigeon, is the parent stock from which all the British varieties have been derived, White, in his "Natural History of Selborne," doubts (and apparently on good grounds) the justness of this remark. It is larger than the common tame pigeon; but the shape and colour are much the same.



The RING DOVE, or CUSHAT, is the largest of the British pigeons. It builds on the tallest trees, and is so strongly

attached to its native freedom that all attempts to domesticate it have (with few exceptions) proved unsuccessful. The ring dove is about ten inches in length; the upper part of the plumage is of a blue ash colour; the lower side of the neck and breast of a purple-red, mixed with ash; the belly is a dirty white, and round the upper part of the neck there is a beautiful white ring, from which the bird derives its name.



The TURTLE DOVE is found in almost every part of Europe and in China. In summer it frequents the western parts of England, and especially the county of Kent, generally building in oak-trees. It is a very shy bird, and chiefly breeds in thick woods. Its general colour is a dull blue; the breast and neck of a purple tint, with beautiful white feathers tipped with black on each side the neck. In addressing his mate the male makes use of a variety of loving

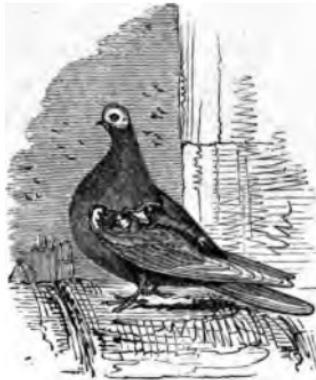
attitudes, cooing at the same time in the most gentle and loving accents.

FANCY PIGEONS have been produced by the great attention which has been paid to pairing and breeding from the finest birds of the several varieties. Among those are reckoned carriers, tumblers, pouters, horsemen, dragoons, fantails, trumpeters, jacobines, &c., &c. I shall only describe a few of these, for the young fancier, having made himself thoroughly master of their peculiarities, will be able to distinguish the others for himself.



The CARRIER PIGEON is famous for its wonderful and enduring speed on the wing, about which some marvellous tales have been told. Before the invention of the Electric Telegraph it was much more used to convey messages than at the present day. The smugglers on the coast took great pride in their carriers, which rendered them important services by conveying intelligence of the purposed running of cargo. Its shape is remarkably elegant; its plumage close, even, and firm, and it possesses a bold, handsome

figure. Round the bill is a sort of wattle, composed of a piece of naked white fungous flesh, which extends to the lower part of the head. The circle round the eye, which is of a reddish orange, is surrounded with a somewhat similar circle of fungous flesh. When this is broad and thick it enhances the value of the bird, being esteemed a certain sign of its healthy condition and superior powers of speed and endurance. The prevailing colour of the plumage is dun or black, though I have seen pied carriers which were very good birds.



The TUMBLER is so called from its habit of tumbling backward when on the wing; the best birds, however, seldom tumble except when they are commencing or terminating their flight. Tumblers are small birds, and the points showing high breeding are a small thin beak, a short round head, thin neck, and a full breast. They are

very lofty fliers, and on a fine clear day will sometimes remain four or five hours on the wing ; and when the birds are accustomed to each other they keep close together in their flight, never rambling apart as some other varieties do. These birds should be kept away from other pigeons, or they would soon begin to fly low, and so become not only less valuable, but the interest in their peculiar lofty flight would be lost.

There are several varieties of the tumbler pigeon known to fanciers, each of which displays its peculiar characteristics, thus :—

The black or blue-bearded variety have a long white dash from the under part of the jaw, a little way down the throat. The ermine (sometimes called the almond) tumbler derives its peculiar name from its plumage, being spotted or marked like the skin of the ermine. The black-mottled tumbler resembles the ermine variety, with this difference, that the plumage should be entirely black, except ten or twelve white feathers on the shoulders. The bald-headed tumbler is distinguished by having its head covered with clean white feathers, in which its pearly eye shows to great advantage ; in shape and carriage it resembles the black-mottled variety.

THE POUTER.—This fine bird at one time was more esteemed than any other variety of pigeon ; but as the excellencies of other breeds have been demonstrated, it has been rather neglected. Perhaps one cause of this neglect may be found in the difficulty with which a stock of

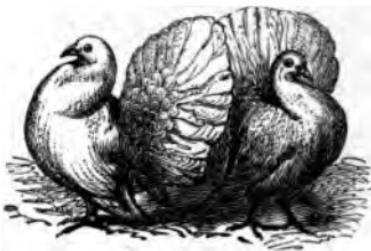
pouters can be kept up, entailing great attention and considerable expense. The hen birds are very careless mothers, and it is necessary to remove their eggs and put them under pigeons of another breed (dragoons are best), and to place the eggs of the other pigeons under the hen pouters, otherwise they would continue laying, and so weaken themselves.



Pouters should not breed in and in; but from time to time the strain should be changed if you wish to preserve the lofty carriage and true features of the stock. The pouter should play erect, with a fine well-spread tail, which must neither touch the ground nor sink between the legs. The crop (which the bird can distend with wind) should be large, and rounded towards the beak, rising on each side the neck, so as to cover and run neatly off at the shoulders. Variety in the plumage is considered to add greatly to the elegance and value of this species. Yellow-pied is most esteemed, *black-pied* comes next in value, then blue-pied.

and red-pied. Fanciers say a fine bird should measure eighteen inches from the extreme point of the beak to the end of the tail-feathers, and have a hollow back, sloping gradually from the shoulders. Many fine birds of this breed have been killed through falling back, owing to their crops being over-filled with air, which they could not discharge.

The POUTING HORSEMAN is a very fine bird, the produce of a cross between a pouter and a horseman.



The FANTAIL, or SHAKER, derives its first name from its manner of displaying its tail like a fan, or in the manner of a Turkey-cock, and its second from a frequent tremulous motion of the neck. This is a very handsome bird; it has a handsome taper-neck, something like that of the swan, and is full-breasted. The tail, which contains from twenty to thirty-six feathers, when properly displayed, is raised up so that it almost touches the back of the head. The plumage is generally white; but some birds are pied of various colours, as blue, black, red, and yellow.

The NARROW-TAILED SHAKER is considered a variety of the former.

The JACOBINE, which is a very scarce bird, has a range of inverted feathers on the back of the head, which turns toward the neck something like the cowl of a monk, from which circumstance it derives its name.

The NUN is so named from its head being almost covered with white feathers, having somewhat the appearance of a veil. It is a small bird, and deserves notice on account of the beautiful and varied tints in its plumage. The nun should have a small head and back, and a pearl eye, and the larger the tuft or veil the more valuable is the pigeon.



The BARB was originally brought from Barbary. It has a short thick beak, to which is attached a small wattle and a circle of naked spongy skin, of a red colour, round each eye. Some have a tuft of feathers sprouting from the back of the head, which adds materially to their appearance. The barb is about the same size as the jacobine; the

plumage is usually dun-coloured or black ; there are pieds of these colours, but they are not much esteemed.

There are many other kinds of pigeons known to fanciers, including CROPPERS, SPOTS, MAWMETS or MAHOMETS, TURBITS, &c. ; but I would not recommend the young fancier to begin with any of these.

In managing pigeons, cleanliness is indispensable, a constant supply of gravel on the floors, and clean water in proper receptacles. Common pigeons will find nearly all their own food during the greater part of the year. Fancy pigeons require considerable attention and more delicate food. Sometimes the young fancier finds great difficulty in mating his pigeons, as sometimes two male birds will pair, and occasionally two females. It is therefore necessary to know your birds, and be sure they are properly mated. In order to do this let two coops be placed close together, the cocks in one and the hens in the other ; these coops should be separated by an open lathed partition, so that the birds may see each other ; they should be freely supplied with hemp-seed, and both feed out of the same vessel. When you notice the hen begin to sweep her tail, place her with the cock, and they will soon agree.. When you have not this convenience, and are obliged to put the birds together, place the cock in the compartment three or four days before the hen. When the birds are mated let them choose their own nest, and be careful to have a clean one prepared for them. If more convenient, you can confine them to one compartment by a lathed partition, taking

care that they are well supplied with food and water for the first eight or ten days.

Pigeons are subject to various diseases. The megrims is incurable. Birds attacked with this disease flutter about at random, with their heads turned round so that the beak rests on the back. The canker is caused by the cocks pecking each other; the part affected should be rubbed every day with a mixture of burnt alum and honey. Should the naked flesh round the eyes of the barb, carrier, or horseman be torn, bathe it with salt water daily for five or six days; should this fail to effect a cure, wash the wounded part with water, in which alum has been dissolved, in the proportion of two drachms of alum to one and a half ounces of water. Some fanciers use a lotion, composed of five grains of Roman vitriol, dissolved in half a spoonful of white wine vinegar, and apply daily. Vermin sadly annoy pigeons, cause them to lose flesh and pine away. Perfect cleanliness will prevent this annoyance to your pets; and when these insects once get into a nest they are very difficult to eradicate: individual pigeons may be cleared of them by frequently fumigating the feathers with tobacco smoke; two or three times a day is not too often.

For the wet roop three or four peppercorns should be given on each third day, and a few sprigs of green rue placed in the water they drink.

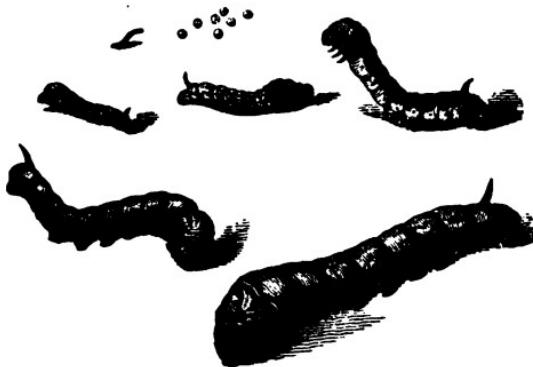
The dry roop proceeds from a cold, and is known by a dry husky cough. The remedy is three or four cloves of garlic every day.

When pigeons do not moult freely remove them to a warm place, give them hemp-seed in their food, mix saffron in their water, and pull out the tail-feathers.

If a pigeon has swelled or cut feet, so that it is lame, apply Venice turpentine, spread on brown paper, to the part affected.



SILKWORMS.



SILKWORM rearing is a very interesting occupation, and in which a careful boy will be sure to show his superiority. There is no difficulty in taking charge of them, much care is required.



THE EGGS.—*These may be purchased very cheaply in*

many places, among others, Covent Garden Market. After you have begun rearing, you can take care of the eggs laid by your own moths. When first laid they are of a pale yellow colour, but in course of time change to a dark hue. Towards the end of April, the paper on which they were laid by the moth should be placed in small and rather shallow trays, which ought to be made of good thick stiff paper (copy-book covers are very good); the edges should be turned up to about an inch all round, and gummed together at the corners. These trays containing the eggs should be placed at a window where the sun may shine fully upon them; the rays of the mid-day sun are the best. Particular care must be taken to place them out of the reach of cats or birds: some persons cover them with a piece of fine gauze. Leave the eggs thus placed until they begin to hatch, and as they are warmed into life receive them upon fresh mulberry (or, where these cannot be got, upon lettuce) leaves: take care not to disturb the unhatched eggs. A small paint-brush is a good instrument to remove them with.

THE SILKWORM.—The little worm is almost black, but it gradually changes colour. While it remains in the caterpillar state the worm changes its skin four times. On these occasions it grows very sickly, and eats little or nothing. The sickness lasts about three days.

RULES TO OBSERVE.—Give them plenty of light and pure air. Keep them in a warm temperature, from 50 to 70 degrees. If the air is very dry moisten the floor slightly with water. If damp, even though it be hot, it must be

dried by artificial means. To bring them to real perfection the air should be kept at an even temperature, and currents of air kept passing through the room to secure its freshness.

If you use lettuce at first you must soon change it for the mulberry, and on no account go back to lettuce after giving them mulberry-leaves, or they will soon die.



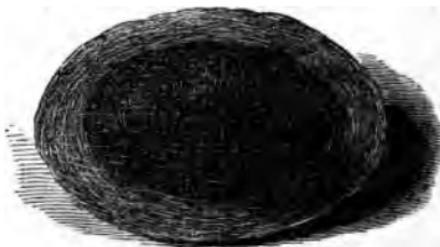
Feed them once a day, before the first sickness; after it, until the third, twice a day, increasing the quantity of food in proportion to the growth of the chrysalis; from the third to the fourth periods of sickness, they must be supplied with leaves thrice a day, and if the weather is excessively warm, four times at the least; from the fourth, until they commence their spinning labours, the food must be given very frequently.

Take care that the leaves are neither too wet nor yet dried up. If you get many leaves at a time, keep them in a cloth *underground* closely packed together.

Clean the trays out every morning, and as the worms get bigger, oftener.

In changing the food do not touch the caterpillars, but lay the fresh leaf at the side of the old one, and they will crawl on to it.

Change them into fresh trays after each sickness.



At the end of forty or forty-five days from the time of their being hatched, they begin to change to a clear transparent pink or flesh colour, particularly on their tails; soon after, they grow restless and refuse their food, crawling to the corners of the tray and moving their heads about. These symptoms indicate that they are about to spin.

Place them now into small paper cones made like those in which grocers pack small quantities of powder goods. They should be about four inches long.

Pin the paper cones against the wall, and let them hang until, by shaking them, you can hear the aurelia or grub *inside*, upon which the silk should be soon wound off. Do *not* shake the paper until the cocoon is about the size of a pigeon's egg.

WINDING OFF.—Remove carefully the outside silk, then place the cocoon in lukewarm water. Secure the end, and then wind on a piece of card by carefully turning the card round and round.



When the silk is wound off there remains a case, in which is the aurelia. Cut this case open, and put the grub in bran near the surface. It will speedily change into a moth.

The moths must be kept in trays with high sides; they will soon lay their eggs, and in two or three days will die.

Pieces of clean white paper should be placed in each tray to receive the eggs.

Take care of the eggs until the spring-time, when, at the end of April, the process of hatching may be commenced, as previously directed.

THE WORKSHOP.

HE is a fortunate boy who can have a workshop set apart for his own use, or for himself and brothers. Even if he have no special mechanical taste, there are many things he can do. It will not be of much use to give minute directions for the use of tools, but we will just advise the young mechanic to see that his tools are in good condition before using them, and in no case to think time wasted which he so occupies. A good workman is known by his tools as well as by his chips.

It is desirable that the tools be not only ready for use, but of good quality, and kept clean and bright. Chisels and gouges should not be thrown into a chest or drawer along with hammers, pincers, vices, etc.; their edges would soon be spoiled, and much time lost in sharpening them.

BOAT-BUILDING is a capital occupation; and if, after practising on small craft, a piece of American pine about two feet long be procured, a very fine vessel may be made by any one who has become at all accustomed to the use of his tools. We should recommend that in the first place you see that your wood is free from knots and splits, and thoroughly seasoned. This done, draw the shape of your model on a piece of paper.

Then square the log according to the length, depth, and width of the craft proposed, and see that your square is a true one.

Fix your log firmly in a vice, or by some other contrivance.

Draw a line from stem to stern along the middle of the side you fix upon for the deck. Next draw upon a piece of paper the shape of one-half of the deck. Place this on the wood and draw a line along its edge, and so mark the wood on one side with the shape of the deck. Turn the paper over and mark the other side in a similar way. You will thus secure the two sides being of the same shape. The line along the middle will guide you where to put the straight edge of the half-deck.

Next draw lines down the stern and stem from each end of the line in the centre of the deck. Nail a piece of wood, cut in the shape of a keel, from the extremity of the stem-line to that of the stern; also nail a piece of similar thickness over the stem-line. Draw the shape of the stern on the wood. Now chisel away the side to the shape you have drawn. Do both sides in the rough first. Be very careful in finishing them to secure their being of the same shape; for this purpose the use of drawings is very desirable. Having finished the outside, use your gouge-chisel for the inside. Work boldly in the centre, and cautiously as you come to the edge. Take care that your sides are of regular thickness. You need not hollow out much of the wood if it is light. Now prepare the deck according to the paper pattern, cutting out the hatchways and holes for the masts. Screw the deck down over the sides.

Make bulwarks of thin strong wood, and fix them on with screws after the deck is on.

The leaden keel should be fixed under the wooden one before the deck is fixed on, and the stem cut to shape.

Make your own leaden keel by cutting a groove in a piece of wood of the exact size, and pouring in lead. If you fix nails into the centre of the groove you will save the trouble of boring the lead afterwards.

If you are handy make your own blocks; but you can get them ready-made.

Make your masts of ash, and for the rigging use whipcord.

The above hints will be found serviceable to those who have already made themselves acquainted with ships and boats, and the plan may be followed for a smaller craft, and then the vice will not be needed.

We have already given directions for making a kite and for the preparation of fishing-tackle; for these and many other things, the workshop will be found of great value.

KALEIDOSCOPE.

THIS simple but effective optical instrument was introduced about the year 1818 as a new discovery, though its claim to this is doubtful. It speedily became so great a

favourite that it could not be manufactured fast enough to meet the demand.

The external substance of the instrument may be made of tin, as the most durable; but for home manufacture a stiff pasteboard will answer the purpose, and be more easily constructed. This must be formed into a cylinder about nine inches in length and two in diameter. Two oblong slips of glass of the same length, and in breadth about one-sixteenth of an inch less than the diameter of the cylinder, must be inserted in the tube so as to face each other at an angle, say of forty-five degrees, though any other angle which would be a divisor of 360 would do.

The best way of testing this angle will be to leave the glueing of the case till it is adjusted by rolling the pasteboard, inserting the glasses, and looking in at the end till you see the reflected angles complete the circle without any irregularity. An angle of forty-five degrees will of course reflect seven others equal in size; an angle of thirty-six degrees would reflect nine others; then a pencil mark along the edge of the pasteboard will indicate how far it must fold over before glueing. The glasses must be fixed in with pieces of cork at each end, cut to fit the case on one edge and the glass on the other, and glued in; but no substance must be seen in the angle between the glasses. Before fastening the glasses, make a paste of lamp-black and water, with which cover the back of the glasses to make the reflection perfect. The ends of the tube must then be made. One of these is simply a pasteboard, shaped like the lid of a pill

box, with a hole in the centre to look through. The opposite end is somewhat similar, but with the centre hole cut to within one-eighth of an inch of the circumference. Into this you insert a round piece of ground glass, which may be kept in place by a circle of iron wire about one-sixteenth of an inch thick. Over this insert a similar piece of plain glass, which may be kept in, in the same manner. These glasses may be cut round *under water* with a pair of strong scissors, a little at once. Between these glasses thus separated by the wire insert a number of little broken pieces of glass of every colour you can procure. These will shift with every turn of the tube and present an infinite variety of the most brilliant and beautiful radiated patterns, reflected into perfect uniformity. The rims of the ends must be broad, especially the one containing the glasses.

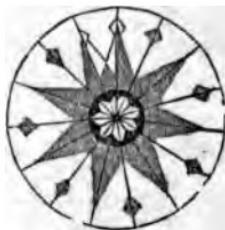


Curved lines produce by their union a multitude of beautiful and elegant figures, of which the variety is inexhaustible. Each group, taken separately, possesses its peculiar and intrinsic beauty ; but the effect of the whole assemblage is considerably heightened by the combination, and by the regularity of the combinations of each part with all the others. In the figure we have here introduced, a line crossing the field in an oblique direction, is converted by the instrument into a polygon of the same number of sides as itself ; that is, into the form of

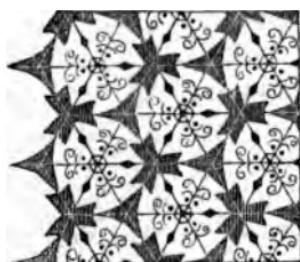
a star having a certain number of rays; and another line, crossing the field in an opposite direction, gives another star, having its points between those of the former.

Our next figure is simpler still, and only exemplifies the effect of a deviation in the angle formed by the mirrors, from that which accurately divides the circle into an even number of sectors. The last ray of the star is here seen to be imperfect; and the cause is, a want of correspondence in the images which meet in the remote sector.

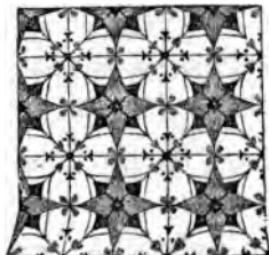
Kaleidoscopes may be constructed in several different methods. Hitherto, we have alluded only to the effects resulting from the combination of no more than two mirrors; but, by employing a greater number of mirrors, an extension of the field, in all directions, may be obtained, and groups of images, round several centres, repeated in perpetual succession upon every side. Kaleidoscopes of this description, of which there are four kinds, have been called *polycentral*, or many-centred; and, when properly constructed, their effects are exceedingly beautiful. For application to the arts, they far excel the simple Kaleidoscope. Some are square, and some triangular; and none afford *the circular forms* which you have yet seen.



They throw figures over a flat extended surface, instead of confining them to a circular space; and however this may please you less as a mere picture, it is better suited to purposes of ornamental design (if so employed), because flat extended surfaces are more commonly to be ornamented than circular. Those Compound Kaleidoscopes were first suggested by Dr. Roget, as additions to the invention of Sir David Brewster.



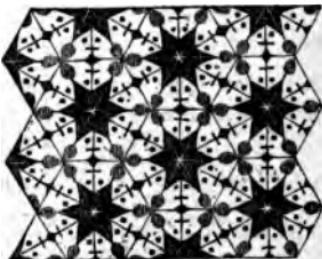
Our first figure, however, was less pleasing than those which we show you now; because in that, the attention being more particularly directed to the repetition of the same set of images in one direction only, the whole pattern appears composed of an alternation of longitudinal stripes. But in the present figure, you see a very regular combination of images, disposed in three different directions.



By yet another formation of the Kaleidoscope, is produced a division of the field of view into regular square compartments. The very perfect symmetry which results from this construction is the source of remarkably beautiful designs; the predominant character of which is an arrangement of forms grouped

together by four at a time, and symmetrically disposed in squares.

The fourth species of Dr. Roget's Compound Kaleidoscope is likewise remarkable for the appearances of very considerable beauty which it produces. Here the predominant form is the hexagon, or six-sided. The symmetry is most conspicuous with reference to the centre, and the attention of the spectator is instantly directed to the six-sided or hexagonal departments into which the field is divided. The pairs of images in these leading objects (such as the stars in the figure, which, it will be observed, have all six rays) are six in number.



The exhibition of the effects of the Kaleidoscope to a number of spectators at the same time, by throwing the images on a wall, after the manner of the magic lantern, or of the solar microscope, might be easily accomplished, if sufficient light could be procured for the illumination of the objects. The brilliant flame obtained from a stream of oxygen gas is peculiarly well adapted to the purpose.

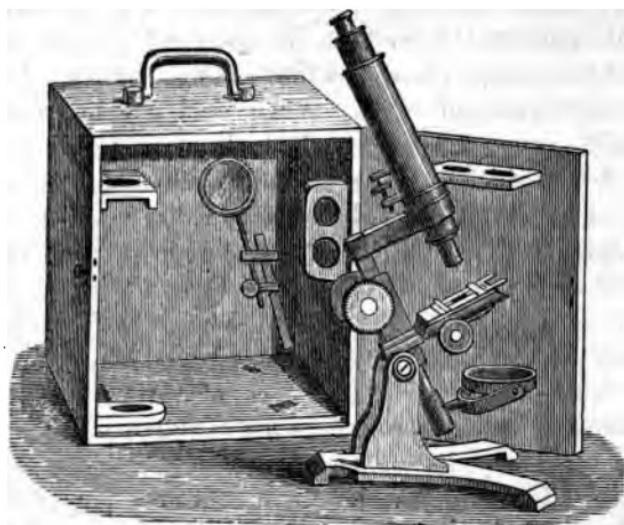
CAMERA OBSCURA.

THIS amusing optical instrument is very easy of construction. The dimensions may vary according to the taste of the constructor.

Make an oblong box about the following proportions:— Width five inches, depth four inches, length twelve inches, more or less according to the focus of a lens introduced into a circular hole in the end. If you leave the end open and form a sliding-piece, of six inches in length, to hold the lens, so as to move it to a longer or shorter focus, like a telescope, so much the more complete is your instrument. In that case it will be necessary to see that the reflecting power of your lens is within the range of its length. If fixed, the focus of the lens (which may be a round spectacle-glass) must reach nearly to the opposite end of the box, and reflect any object upon a piece of sloping looking-glass, placed at an angle of forty-five degrees, a slip of wood being glued across the bottom of the box to prevent the mirror from sliding forward. The mirror must not reach quite to the top at the end, room being left for a slip of wood to support one end of a piece of ground glass which lies horizontally over the mirror to receive the reflection of its objects, the other end of the ground glass resting on a slip of wood glued to the under side of a fixed lid which extends along more than two-thirds of the box. About three inches and a half will then be left open to receive a moveable lid, which may be joined to the fixed part by a

slip of thin leather or stout canvas glued to form a hinge. This lid must be thinner than the fixed part by the thickness of the ground glass, to admit of shutting over it as it rests on the slip of wood. When used, the lid must be partially opened to admit as little light as possible; the sides being shielded by pieces of thin wood cut in the shape of quadrants, with the edges glued or bradded under the edges of the lid. The width of the glasses must be regulated so as to admit of the quadrants sliding beside them. The beauty of the objects reflected will repay any amount of trouble; it presents a coloured photograph of fixed or moving scenes. The effect of waving trees is enchanting. If larger dimensions are required, a larger lens will be necessary, but not an increase in magnifying power, which would require a shorter instead of a longer focus. The *length* of the box must be proportionably less with a large than with a small lens.

This instrument is often used when it is desired to draw the landscape that is represented. For this purpose an opening is made in the side of the box, through which the draughtsman may put his head and hand inside: he must draw a curtain to exclude the light, and he can then trace the outlines of the picture, as represented at the bottom of the box.



THE TELESCOPE.

THE principal varieties of this instrument are *refracting* and *reflecting*. Each of these has its peculiar advantages; but for astronomical observations the reflecting telescope is generally preferred. Both kinds are made of almost all sizes, from the pocket-telescope to the great reflector of the late Sir William Herschel, at Slough, which is forty feet in length, and four feet in diameter. The most marvellous instrument, however, is that of Lord Rosse's, which is fifty-six feet in length, with a speculum, or concave mirror, six feet in diameter. It has led to very minute and important discoveries on the surface of the moon. What is termed

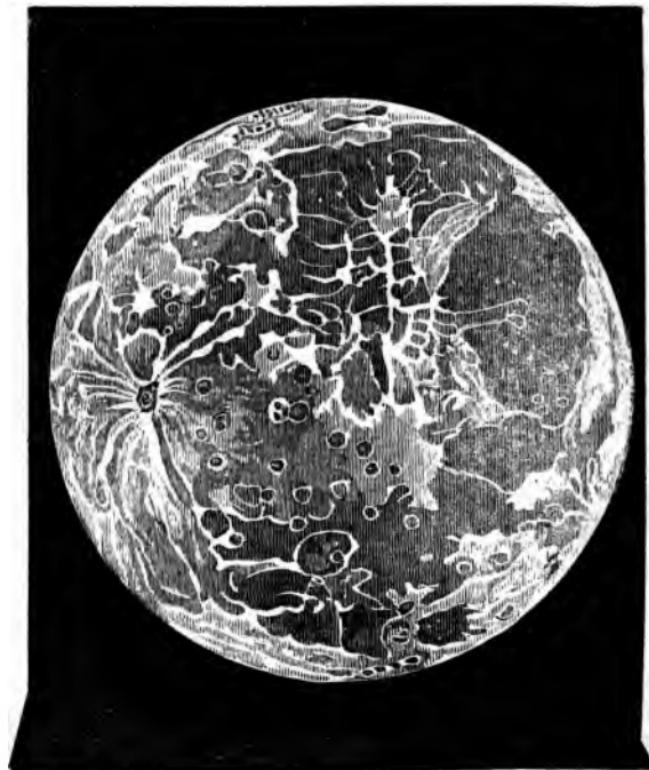
the *achromatic* telescope was invented by Mr. Dollond, to remove the defect of the common telescopes, that of fringing the object viewed with the prismatic colours. In the annexed illustration, the two handles, *h*, are for moving the



rack-work in setting the instrument; the sliding tubes, *i i*, are for the purpose of steadyng it; and the small tube, *E*, is called the finder, its use being to find the object more readily than can be done by looking through the large

tube, *a a*: the eye-glasses all fit into the brass tube, *b*, which is made to move out or in at pleasure, to adjust the distance between them and the object glass, so as to suit any sight.

Here is a representation of the surface of the moon, when full, as she appears through a very good telescope.



The apparent magnitude of all objects is very different from their real magnitude ; and it is only by experience that we learn to form a correct judgment in this case as to the size of objects seen at a distance. Objects appear to us to be large or small according to the angle under which we view them : the nearer they are to us, this angle is the greater ; and the further off they are, it is the less. Again, the nearer we are to any object, the more distinctly do we see it ; and in proportion to its distance from us, we see it the more imperfectly.

Now, it is to counteract these effects that the telescope is constructed : the glasses are so formed that objects seen through them appear to be seen under a greater angle than when viewed with the naked eye, consequently they will *appear* to be both larger and nearer, and we shall see them more distinctly. A telescope is said to enlarge an object just as many times as the angle under which it represents it is greater than that under which it appears to the naked eye. Thus, the moon appears to the naked eye under an angle of about half a degree ; consequently, a telescope magnifies one hundred times, if it represents the moon under an angle of fifty degrees. There are points in the heavens where no object can be seen with the naked eye ; but turn a powerful telescope to that spot and you will see an immense number very distinctly, and their numbers increase as the power of the telescope increases, as it brings into view vast numbers of stars that were either too small or *too distant to be seen* by an instrument of lower power.

Others, in like manner, may be seen from the opposite side of the earth ; so that we seem in the midst of infinite space filled with worlds.

In one small portion of the Milky Way, Sir W. Herschel discovered no fewer than *fifty thousand* stars, large enough to be distinctly numbered as they passed before his large telescope, besides as many more which could only be faintly and occasionally seen. These are called fixed stars, because they always keep the same distance from each other, and the same distance from the sun, which is also immovable ; and were the sun placed at the immense distance from us at which they are, it would appear no larger than the stars. Hence it is believed that every fixed star is a sun, having a system of planets revolving round it, like our solar system.

"If we suppose," says Professor Whewell, "the earth to be represented by a globe a foot in diameter, the distance of the sun from the earth will be about two miles ; the diameter of the sun, on the same supposition, will be something above one hundred feet, and, consequently, his bulk such as might be made up of two hemispheres, each about the size of the dome of St. Paul's. The moon will be thirty feet from us, and her diameter three inches,—about that of a cricket-ball. Thus the sun would much more than occupy all the space within the moon's orbit. On the same scale, Jupiter would be above ten miles from the sun, and *Uranus forty*. We see then how thinly scattered through space are the heavenly bodies. The fixed stars would be at an un-

known distance; but, probably, if all distances were thus diminished, no star would be nearer to such a one-foot earth, than the moon now is to us.

"On such a terrestrial globe, the highest mountains would be about one-eightieth of an inch high, and, consequently, only just distinguishable. We may imagine, therefore, how imperceptible would be the largest animals. The whole organized covering of such an earth would be quite undiscoverable by the eye, except perhaps by colour, like the bloom on a plum!"

And now, changing the view, this writer remarks, that, "In order to restore the earth and its inhabitants to their true dimensions, we must magnify the length, breadth, and thickness of every part of our supposed models, forty millions of times; and, to preserve the proportions, we must increase equally the distances of the sun and the stars from us. They seem thus to pass off into infinity, yet each of them thus removed has its system of mechanical, and perhaps of organic, processes, going on upon its surface."

Dr. Dick, in his excellent work on "The Telescope and Microscope," has a cheap and easy method of constructing a telescope for observing the heavenly bodies, the substance of which we will give.

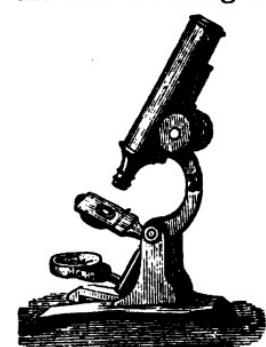
Procure a double convex lens (such as a common spectacle glass), of a focal distance of about three feet, which is to be placed at the end of a tube nearly the same length. In a smaller tube sliding into this, insert a smaller lens of one-inch focus, so that when adjusted it will be thirty-seven

inches from the other glass. The opening through which light can pass from the outside to the larger glass must be about an inch, that at the other end considerably smaller. Place the glasses so exactly, that rays passing from one should fall on the centre of the other. The tube, which may be of zinc or pasteboard, should be blackened inside : a telescope thus constructed will show the objects inverted. For observing the stars this would be of no importance.

As a striking contrast to the wonders of the telescope, we contemplate those of

THE MICROSCOPE :

the one extending our field of vision even to distant worlds, and systems of worlds, the other taking the minutest particles of organized matter, and revealing forms and functions of whose existence no one could have formed the remotest conception.



Of these microscopic wonders, in the instance of shells and the animals contained in them, we are told by Dr. Buckland, that "minute examination discloses occasionally prodigious accumulations of microscopic shells, that surprise us no less by their abundance than their extreme minuteness : the mode in which they are sometimes crowded together may be estimated

from the fact, that Soldary collected, from less than an ounce and a half of stone found in the hills of Casciana, in Tuscany, ten thousand four hundred and fifty-four microscopic chambered shells! The rest of the stone was composed of fragments of shells, of minute spines of echini, and of a sparry calcareous matter.

"Of several species of these shells, four or five hundred weigh but a single grain; of one species he calculates that a thousand individuals would scarcely weigh one grain. He further states, that some idea of their diminutive size may be formed from the circumstance, that immense numbers of them pass through a paper in which holes have been pricked with a needle of the smallest size.

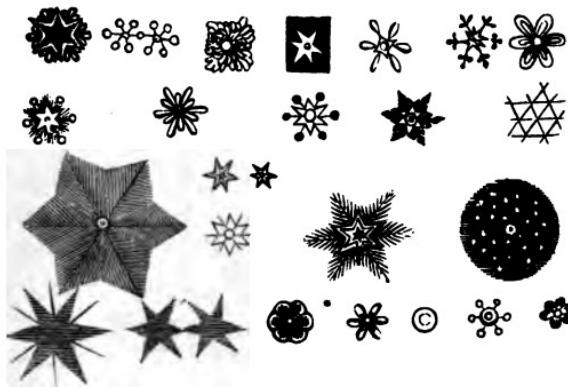
"Our mental, like our visual faculties," he adds, "begin rapidly to fail us, when we attempt to comprehend the infinity of littleness towards which we are thus conducted, on approaching the smaller extremes of creation."

The objects of microscopic examination are almost infinite. Nearly every department of the physical sciences is illustrated by it:—Chemical processes are discerned that would escape the naked eye—botanical and animal dissections—insect life of every conceivable variety—revealing in the drop of water forms of hideous ferocity preying on each other, or of peerless beauty disporting themselves as if in a sea of pleasure. Of these, some whose diminutive forms could not be discerned by a moderate magnifying power exhibit a beautiful circle of the size of a shilling, *whirling round with immense velocity—a living chroma-*

trope—then parting into shapeless projections, anon resuming its perfect circle and its rapid play. Then we may turn to the vast new wealth of the fossil world, deep down in the rocks, which have held them through countless successions of ages, beyond the power of imagination to picture. In some of these a cube of one-tenth of a cubic inch is computed to hold five hundred millions of individuals. Of the *infusoria* found in still living forms, Dr. Ehrenberg tells us one cubic inch contains forty-one millions; yet the microscope reveals all their brilliant colours, their minutest organizations of muscles, intestines, teeth, glands, eyes, nerves, &c. These astonishing revelations are only made through the highest magnifying power. Very effective instruments, however, may be purchased for two guineas. A smaller one, on a simpler construction, may be obtained for about ten shillings; and every one is familiar with the hydro-oxygen microscope, as exhibited at the Polytechnic, and other places of amusement. This consists of a reflection thrown by a sort of magic lantern with an intense light. A little water from a butt placed on the slide exhibits animals, of less than a quarter of an inch, magnified to the length of a man's arm, darting upon and devouring each other.

There are few objects of microscopic examination more deeply interesting than *snow-flakes*, though, from their evanescent character, it is not a very easy thing to examine *them minutely*; and it is not every snow-storm that yields the beautiful crystals portrayed in the cuts we have given.

A more than ordinary measure of cold in the upper current of the atmosphere favours their production, it being in

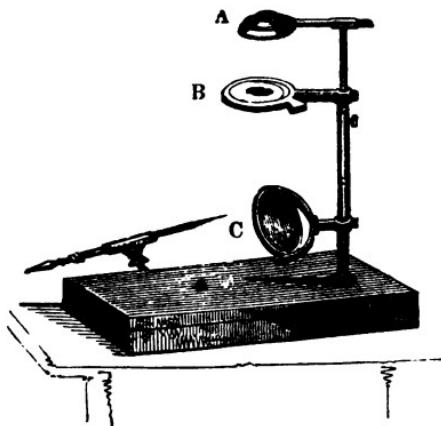


SNOW-FLAKES SEEN THROUGH A MICROSCOPE.

regions higher than those in which rain is formed that these crystals of the vapour are generated. It is not difficult to see, by the delicate points abounding in the flakes, when these splendid specimens may be obtained. If, then, a hat or black cloth is held, there will be time for their examination, provided they are not taken into a warm room.

Very fine effects are produced by the Stanhope lens, which is a simple pocket instrument, consisting of a little bit of glass with spherical ends mounted on a piece of wire. *No one interested in tracing the forms of living or defunct*

organisms ought to be without one of those convenient little pocket lenses, which close on the plan of a comb, to examine any specimen that falls in his way.



No. 1.

The upper part, A, contains the magnifying-glasses. The objects to be examined are placed on a slip of thin glass, which slides through the brass frame or stage, B, which slides up or down on the brass stem, to suit the focus of the magnifier. The lower part contains a reflecting mirror, C, for the purpose of throwing as much light as possible on the object under inspection.

The four microscopes here represented were made by Wood, of 74, Cheapside, who in 1851 received the Exhibition Medal for his photographic apparatus.

No. 1 is a stand microscope, with three powers for opaque objects.

No. 2 is an achromatic microscope, with two powers and achromatic object-glass.



No. 2.



No. 3.



No. 4.

No. 3 is a larger size achromatic microscope, with achromatic object-glass, forming three powers.

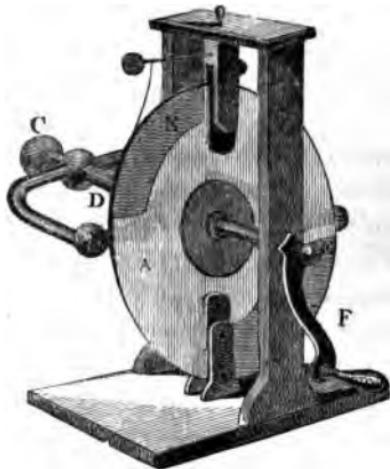
No. 4 is a microscope for a more advanced student, and is more expensive than the preceding.

ÆOLIAN HARP.

THIS is a charming instrument, producing by the action of the wind on its strings a soft swell of sounds, sometimes uttering sonorous chords, and anon receding to low plaintive murmurs, like a lute in a distant wood.

To construct this harp you should procure two pieces of deal, about three-eighths of an inch in thickness, and of such a length as will fill up the space under the sash of a window in a landing or some other exposed place. The pieces of wood may be about five inches wide. Then take two pieces of the same length, one about two and a half and the other two inches in width, to form the sides of a box, of which the others will be the top and bottom. Two little thick pieces will also be required for ends, on the edges of which the others may be bradded. Before putting them together make a circular hole in the middle of the upper piece about two inches in diameter; you will then require two small pieces of wood for bridges, across which the strings must be stretched. These should be similar in shape to the box, having one side about an inch and a half, the other an inch high. Cut six grooves with a fine saw to the level of the lower side to receive the strings; then in the higher side insert in the one piece a row of wires sufficiently strong to bear the tension of cords, and in the other a row of screws similar to those in a pianoforte. On these, cat-gut strings of uniform size may be moderate stretched and tuned in unison. Over the whole a half-in-

board may be placed, two wire studs being screwed through each of the bridges into the box to receive it, and keep the whole in place. Keep the strings free from oil or grease.



ELECTRICITY.

It is not a hundred years since this science was so little understood, that its relation to the thunderstorm was not even dreamed of by classes of people who now accept it as one of the facts of every-day life. The experiments of Franklin with the paper kite, to determine its laws by extracting the electric fluid from the clouds, was looked upon as something presumptuous and akin to profane, and

the fact that one experimenter, through ignorance of some of the conditions, lost his life, was deemed conclusive of a Divine judgment having overtaken the daring invader of a Divine prerogative. Little was it then dreamed that electricity would be studied and experimented on till it was so much understood as to be made our servant, for conveying our thoughts to the ends of the earth with lightning rapidity.

Almost every schoolboy now knows that electricity is an invisible fluid existing in all animal life, and in a vast number of substances which only require exciting by friction to produce some of its most remarkable effects; for example, only rub the edge of a watch-glass, or a piece of sealing-wax, quickly on your coat-sleeve, and the magnetic power hid in electricity is so excited, that you may take up little bits of paper, or any light substance, as you would take up a needle with a magnet.

Mr. E. G. Wood, of 74, Cheapside, has all the Electric and Galvanic instruments, of which woodcuts are given, always on hand.

ELECTRIFIED PAPER.—A similar magnetic effect may be shown, by *thoroughly drying* by the fire a large sheet of writing-paper, laying it on a flat tray, and rubbing it all over smartly with India-rubber. Its adhesion to the tray will be so strong, as to resist efforts to remove it, except by force. A still stronger electric effect may be produced by a piece of very coarse brown paper, about a foot long and six inches wide, drawn sharply between two woollen

surfaces, as the knee and the sleeve. A spark may be got from it by the knuckle being immediately applied. It must be previously made very dry and warm. Striking together two pieces of loaf-sugar in the dark will elicit a flash of light.

It is glass that is used for producing this fluid in the electrical machine. This glass is made in one of two forms; either a cylinder placed horizontally, or a thick round plate placed upright. In either case a handle is turned, and the glass rubbed hard against a cushion, that is pressed on it. In the plate machine, as shown in the cut (p. 311), the circular glass plate, A, is mounted upon an axis, and rubbed by two pairs of cushions, B B. The brass conductor, c, has its points directed towards the plate, and is insulated (*i.e.* mounted on glass) by the stem, d. E E are double pieces of oiled silk, passing from the cushions to near the points. The whole is supported by a strong mahogany frame; and the plate is turned by the handle, f. The plate is two feet in diameter, and when turned smartly round, will produce a very good supply of the electric fluid. You must observe, however, that the cushions are anointed with a metallic substance, called amalgam, composed of one part of tin, and two of zinc, melted together, and mixed, while fluid, with six parts of warm mercury in an iron mortar. The mixture is then triturated till it becomes a fine powder, which is then formed into a tenacious paste with hog's-lard. It should be spread evenly on the cushions with a blunt knife. It is chiefly owing to

this amalgam that the friction of the plate on the cushions produces streams of fire which issue from the brass conductor. The knuckle, or any joint held near it, receives a spark and a slight shock in the joint.

But nature has electrical machines of its own, as in the instance of the *Torpedo* and the *electric eel*, a river fish of South America. The governor at the Dutch colony of New Amsterdam had a large electric eel, which he kept for several years in a tub made for that purpose, placed under a small shed near to the house. This fish possessed strong electrical powers, and often caused scenes of diversion among the soldiers and sailors who are strangers to the country, and struck with astonishment at its qualities. Two sailors, wholly unacquainted with the properties of the animal, were one day told to fetch an eel which was lying in the tub in the yard, and give it to the cook to dress for dinner. It was a strong fish, of seven or eight pounds weight, and gave a severe shock on being touched, particularly if at all irritated or enraged.

The sailors had no sooner reached the shed, than one of them plunged his hand to the bottom of the tub to seize the eel, when he received a blow which benumbed his whole arm : without knowing what it was, he started from the tub, shaking his fingers, and holding his elbow with his other hand, crying out, "I say, Jack, what a thump he fetched me with his tail!"

His messmate, laughing at "such a foolish notion," next put down his hand to reach out the eel, but receiving a

similar shock, he snapped his fingers likewise, and ran off, crying out, "Why, he did give you a thump! He's a fighting fellow! He has fetched me a broadside, too! Let's both have a haul at him together, Jack, then we shall board his slippery carcase in spite of his rudder."

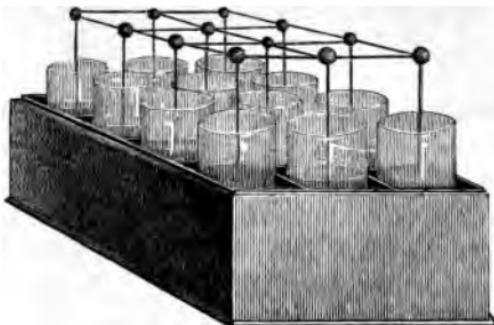


Accordingly they each plunged their hands into the tub, and seized the fish by a full grasp round the body. This was rougher treatment than he commonly experienced, and he returned it with a most violent shock, which soon caused them to quit their hold. For a moment they stood aghast, then rubbing their arms, holding their elbows and shaking their fingers, they capered about with pain and amazement, swearing that their arms were broken.

The LEYDEN JAR is a most effective invention, used to collect such a quantity of the fluid as will impart an

electric shock more or less powerful, in proportion to the quantity of the fluid contained in it. The jar is constructed of glass, covered more than half way up with tin-foil inside and out. A brass wire surmounted by a ball is passed through the neck of the jar to the bottom, where a chain connects it with the tin-foil, the ball rising two or three inches above the jar. A shock may be produced by placing one hand on the ball, and with the other touching the tin-foil outside.

AN ELECTRIC CIRCLE.—To communicate the shock to any number of persons, it is only necessary to let them join hands, and for the first person to hold a wire that is passed round the tin-foil on the jar, and the other a wire



that is attached to an instrument called the discharger. *This consists of a curved piece of brass wire, with a ball at each end, and a handle projecting from the middle.* This

handle may be of glass or gutta percha, so that the person holding it is not affected. The wire in the hand of the last person being attached to one end of this, the other end is brought into contact with the ball of the jar, when the shock occurs and the jar is emptied. This instrument is also used simply to discharge a jar, which is done by bringing its two balls into contact with the jar, the one touching the foil and the other the ball. A number of Leyden Jars collected in a box, and connected by a framework of brass wire, forms an electric battery.

POSITIVE AND NEGATIVE ELECTRICITY.—The terms *positive* and *negative*, as applied to electricity, indicate that the subject of these conditions has more or less than its natural measure; for example, a person who has received any considerable portion of the fluid from a machine is in a positive state, and will, if standing on a glass stool, be in a position to part with a portion of it in sparks, to any one who touches him, or even his clothes, with his knuckle. The debility of invalids sometimes arises from a deficiency of electric matter; they are in a state of negative electricity, and accordingly the fluid is imparted to them by a galvanic battery, of course under medical direction. Any one in a state of positive electricity will show it by his hair standing out: a spark taken from him will cause it to collapse.

ATTRACTION AND REPULSION.—A very light feather, or a piece of the pith of elder, placed near a charged conductor (the latter being suspended by a thread), will be instantly attracted, and in a short time recedes.

Rub a tube of smooth glass till it is excited ; if, then, you float a very downy feather in the room, and bring the glass within a few inches of the feather, it will rush to it and remain till it has acquired a portion of electricity, when it will recede, even though followed by the tube, till it has touched some conducting substance.

If a stick of sealing-wax be excited at the same time as the glass, the feather may be kept darting from the one to the other ; the one being in a positive, the other a negative state.

DANCING FIGURES.—Prepare figures by cutting them into shapes out of elder-pith, lay them on a circular metal plate on the table, or a round board covered with tin-foil ; suspend a similar plate, rather smaller, by a chain from the conductor, within an inch or two of the lower plate ; work the machine, and the figures will dance in the most curious and grotesque manner.

ELECTRIFIED CAMPHOR.—Put a lump of camphor into a spoon, set fire to it, and bring it into contact with the conductor, it will immediately throw out beautiful corruscations.

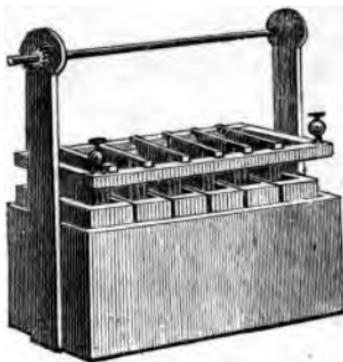


GALVANISM.

GALVANIC OR VOLTAIC BATTERY.—This is a mode of eliciting electric force by means of a chemical operation. The immersion of two metals, in a weak solution of sulphuric acid, and connecting their ends either by contact or by wires, produces an immediate chemical action, the effects of which are transmitted by wires in a similar manner to those sometimes employed in an electrical machine. The metals may be zinc and silver, or zinc and copper. Any one taking these wires into either hand will perceive a



slight action through the nerves. An instrument for medical uses generally consists of a single plate of zinc, between two very thin plates of copper united at the top. These are inserted in the solution, and wires being applied with handles at the end, the patient holding them experiences a tingling sensation through the nerves. A battery for producing greater effects, consists of a long trough with a succession of plates, usually with the two metals soldered together, as in the accompanying cut.



COMPOUND SMEE'S BATTERY.

Experiments by this machine of a most interesting kind have been made on a dead animal. The crural nerves of a frog being touched by the wires, occasioned it to strike out as if swimming. We once witnessed a sheep that had been killed in the usual manner, struggling to such a degree, that the astonished and dismayed butcher, who *had brought it into the lecture-room, could not hold it.*

He solemnly and with great awe assured the lecturer that it "was dead once."

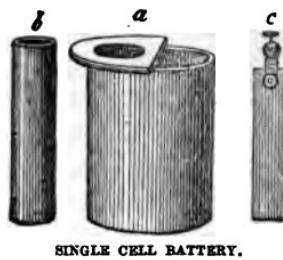
Experiments have also been tried on executed criminals, which have succeeded in producing violent contortions of the eyes, and the limbs, and even laborious breathing. Even the forefinger of the right hand was made to point from an outstretched arm, so as to make some of the spectators think life had returned.

In experimenting with a dead frog, some little knowledge of its anatomy is requisite, which is not, however, very difficult to obtain, and the mode of operating may be acquired by an observant attendance on a practical lecture.

An interesting application of the battery is

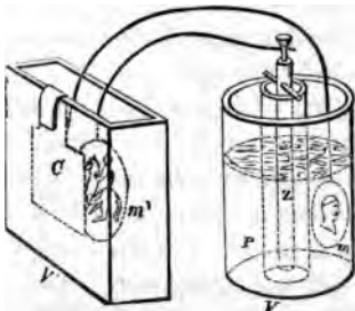
ELECTROTYPE.—It was about the year 1839 that the process called Electrotype was brought under the notice of the public. Before that time, although it was known that one of the poles of a galvanic battery had the power of reducing metals from their solution, it had never occurred to the mind of any one to apply that power to its present use, namely, the producing copies in metal of any required object when placed in such a situation as to be acted on by the voltaic or electric power.

The simplest plan of producing the copy of a medal is the following:—Procure a glass or earthenware jar, resembling the larger vessel shown in the illustration. The



SINGLE CELL BATTERY.

small cylinder placed within this jar is porous, and may be made of plaster of Paris; but cylinders of this kind are to be had now of almost any optician, formed of biscuit porcelain, or that kind of clay used in making wine-coolers.



Z is a flat piece of zinc, having that side which is furthest from the medal M, which is to be copied, covered with sealing-wax varnish; the wire also may be covered with the varnish as far as W; the other side, having been first wetted with dilute sulphuric acid, is rubbed over with mercury until a thin coat of an amalgam of mercury and zinc is formed on its surface. The zinc is connected by means of a copper wire, to which it is soldered to the mould M. A cast having been taken in bees'-wax of the medal of which a copy is required, the end of the wire W is slightly heated, and being applied to the back of the waxen cast, adheres to it when cold.

Finely powdered black-lead is now rubbed over the face

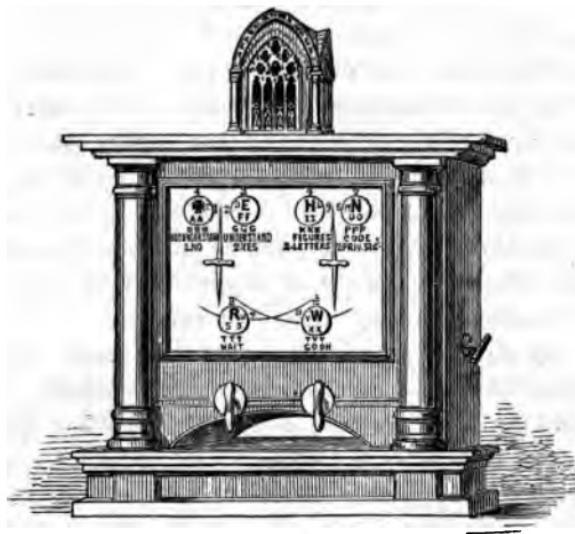
of the cast, and also on so much of the edge of the wax as will continue the coating of black-lead until it reaches the wire.

Now fill the inner porous cylinder with one part sulphuric acid, and ten parts water. Fill the jar also with a saturated solution of sulphate of copper (*blue stone*). Voltaic action then commences : a current of electricity passes from the zinc to the mould, and the copper contained in the solution of sulphate of copper in the jar is deposited in a metallic form upon the mould M. This process is necessarily slow, but in the course of about twenty-four hours a sufficient quantity of copper will have been deposited to allow the copy to be removed.

It is by the galvanic battery that that most wonderful of all inventions, *The Electric Telegraph*, is worked. This is dependent on a property of electricity to which we have scarcely yet referred—its magnetic influence. An electric current may be applied to an iron bar across the ends of a bent iron, that will make it support upwards of a hundred-weight, the attraction ceasing the instant that the connection with the battery is broken. This power is accompanied by the polar influence which attends magnetism, so that a needle placed in equilibrium will, when touched with an electric current, point to the North and South Poles like a magnet.

In the construction of a telegraph needles are employed, but they are magnetized by the application of an ordinary magnet, and retain their power. The wire along which

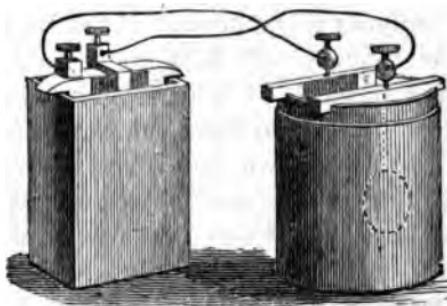
the electric current runs is brought near the needles out of sight, and causes them to deflect right or left, according to the direction of the current over them; an inclination



to the left will indicate a particular letter, that to the right another, two successive movements indicate another, and three another, &c. The needles at a distant station correspond in their movements and indications, so that what they are made to do, these do by the wire that connects them.

The way to operate on the wire, and consequently on the needles connected with them, is by means of a pair of

handles on the dial, which the operator can use while he sees the effect of his work on the needles. The handles are connected with wires, which dip into the battery, and produce the current in the direction required.



SMEE'S BATTERY AND PRECIPITATING TROUGH.

The principle of the thing being understood, it is easy to imagine that the details would be the subject of improvements in rapid succession. By reverse movements of the handles, made with the rapidity which practice gives, words are spelt in far less time than formerly. The strength of the battery is proportioned to the distance the current has to run. In ordinary electric operations a double wire is employed, the one from the zinc plate, the other from the copper, which are brought into contact either directly or through a conducting medium, the electrified person being that medium. In the case of the electric telegraph the circle is completed by the moisture below the surface of the earth, every station having a

large zinc plate sunk below, and connected with the telegraph by wires into the station.

Our young readers must often have observed the wires resting on pieces of glazed earthenware, it is to be hoped with more intelligent interest than was evinced by the negro who, replying to the inquiry of his friend what the posts were for, replied, "To hold the wires up." "Then what are the wires for?" "Why, nigger, to hold the posts up, to be sure." Without these non-conductors the fluid would go to the earth down the first post it came to. The moisture of tunnels has also to be guarded against by coatings, lest it should divert the current to the ground above.

Many persons have a notion that birds touching the electric wires during their action will be killed, and allege in evidence the occasional finding of dead birds beneath. This, however, is occasioned by their not seeing the wires in their rapid flight, and striking against them. We may see hundreds of swallows sitting by the hour together on the wires, as unconscious of danger as they are of the crowds of thoughts and tidings winging their way between their claws.

MAGNETISM.—This is a property first discovered to belong to certain masses of ore found in iron mines; its peculiarity consists of two things, its power to attract iron, and its tendency to impart a polar direction to every piece of iron on which it is rubbed, which from its shape and free position is susceptible of spontaneous motion. Thus a

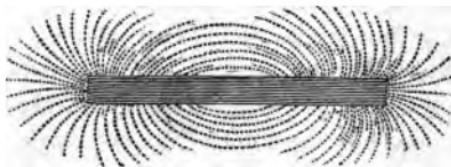
common needle magnetized and gently placed on the surface of a basin of water (where any fine straight needle will float), will immediately turn its points to the north and south poles. The corresponding poles of two needles repel each other, but the north pole of one attracts the south pole of the other. So in a horse-shoe magnet, if the bar across be magnetized, it is necessary to put the south pole of the bar to the north pole of the magnet.

The natural magnet, or loadstone, is commonly of a very dark grey colour, approaching nearly to black; it is remarkably compact and heavy, and has a metallic lustre. As it is an ore of iron, it may be asked, how comes it that all iron ore is not magnetic? To this question no satisfactory answer can be given. Most probably, as Dr. Hutton supposes, this particular ore contains some principle which does not enter into the other ores of the same metal; but what that principle is we cannot hope to know, till scientific research has done much more than it has accomplished since the beginning of the thirteenth century.

If you suspend to a bar as much weight as the magnet will hold, leave it a day and its magnetic power will be increased. Add a little more to it and it will go on increasing slightly from day to day, but not without limitation. If, however, the weight applied be too much, and suddenly break it off, the power of the magnet is sensibly diminished, and must be restored by the gradual attachment of increasing weight, beginning with such as it

will easily hold. A magnet will lose much of its power if it is kept without the iron attached.

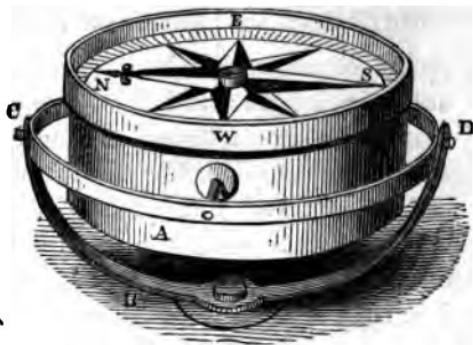
MAGIC NEEDLE.—Float a needle that has been rubbed with a magnet in the middle of a basin of water, conceal the magnet in your hand, and present your knuckle, with the south pole of the magnet behind it, to the edge of the basin. If the south pole of the ~~needle~~ be the nearest to it the needle will dart to the opposite side of the basin ; if the north pole be nearest it will come towards your hand. This operation, accompanied with words of command, will deceive the uninitiated.



MAGNETIZED FILINGS.—Place steel filings on a tray or plate, and under them move slowly the points of the magnet, and they will perform curious and entertaining movements.

MARINERS' COMPASS.—It is easy to see how the discovery of the polar property of a magnet led to its use in navigating ships when neither the heavens nor the earth were visible. A piece of magnetized steel balanced in sight of the steersman would always show him in which direction the north and south lay ; but a more minute and complete method of using the discovery consists in fixing

the needle on the under side of a card, with a circle divided into thirty-two points, distinctly marked. This card moving with the needle, the steersman moves the helm till the direction in which he wants to sail is indicated by that point of the compass being straight before him pointing to the bows of the ship. The compass is suspended by contrivances which prevent its getting out of the horizontal by the motion of the ship, and the friction on the axis of the needle greatly reduced.



There is also a tendency in the northern pole of the needle to deflect below the horizon. The effect of this is also counteracted by a contrivance to admit of the dip without disturbing the horizontal position of the card. It is also necessary to guard against the effects of iron in the neighbourhood of the compass.

VARIATION OF THE COMPASS.—By this is not meant those *accidental changes* which the presence of iron or undue

motion may occasion, but the difference between the direction of the north pole of the needle and the geographical North Pole, which is generally a few degrees, but varies under different circumstances, which require all the knowledge and attention of a skilful navigator to calculate. From an ignorance of the principles of this variation many a gallant ship has met her doom.

DIVISIBILITY AND DIFFUSION OF MATTER.

A SINGLE pound of cotton has been spun into a thread seventy-six miles in length; and the same quantity of wool has been extended into a thread of ninety-five miles: the diameters of those threads being hence only the three hundred and fiftieth, and four hundredth part, of an inch!

But the ductility of some metals far exceeds that of any other substance. The gold-beaters begin with a riband, an inch broad and one hundred and fifty inches long, which has been reduced, by passing through rollers, to about the eight hundredth part of an inch in thickness. This riband is cut into squares, which are disposed between leaves of vellum, and beaten with a heavy hammer, till they acquire a breadth of more than three inches, and are therefore extended ten times. These are again quartered, and placed between the folds of gold-beaters' skin, and stretched out, by the operation of a lighter hammer, to the breadth of five inches. The same process is repeated, sometimes more

than once, by a succession of light hammers; so that three hundred and seventy-six grains of gold are thus finally extended into two thousand leaves of 3'3 inches square, making in all eighty books, containing each twenty-five leaves. The metal is, consequently, reduced to the thinness of the two hundred and eighty-two thousandth part of an inch, and every leaf weighs rather less than the fifth part of a grain! Silver is likewise capable of being laminated, but will scarcely bear an extension above half that of gold; or, the one hundred and fifty thousandth part of an inch thick. Copper and tin have still inferior degrees of ductility, and cannot, perhaps, be beat thinner than the twenty thousandth part of an inch. These form what is called *Dutch leaf*.

In the gilding of buttons, five grains of gold, which are applied as an amalgam with mercury, are allowed to each gross; so that the coating left must amount to the hundred and ten thousandth part of an inch in thickness. If a piece of ivory or white satin be immersed in a nitromuriate solution of gold, and then plunged into a jar of hydrogen gas, it will become covered with a surface of gold hardly exceeding in thickness the ten millionth part of an inch. The gilt wire used in embroidery is formed by extending gold over a surface of silver.

The silk line, as spun by the worm, is about the five hundredth part of an inch thick; but a spider's line is, perhaps, six times finer, or only the thirty thousandth part of an inch in diameter: insomuch, that a single pound of

this attenuated substance might be sufficient to encompass our globe !

The earthy substance, denominated emery, is thrown, after it has been ground, into a vat filled with water, and the fineness of the powder is distinguished by the time of its subsidence. In very dry situations, the dust lodged near the corners and crevices of ancient buildings is, by its continual agitation in the air, made to give a glossy polish to the interior side of the pillars and the less prominent parts of those venerable remains. So fine is the sand on the plains of Arabia, that it is carried sometimes three hundred miles over the Mediterranean by the sweeping sirocco. Along the shores of that sea, the rocks are covered by the pholas, a testaceous and edible worm, which, though very soft, yet, by unwearyed perseverance, works a cylindrical hole into the heart of the hardest stone. The marble steps of the great churches in Italy are worn by the incessant crawling of devotees ; nay, in the lapse of ages, the hands and feet of bronze statues are wasted away by the ardent kisses of innumerable pilgrims. What an evanescent pellicle of the metal must be abraded at each successive contact ! The solutions of certain saline bodies, and of other coloured substances, exhibit a prodigious subdivision and diffusion of matter. A single grain of the sulphate of copper, or blue vitriol, will communicate a fine azure tint to five gallons of water. In this case, the copper must be attenuated at least ten million times ; yet each drop of the liquid may contain many coloured particles, distinguishable

by our unassisted vision! A still minuter portion of cochineal, dissolved in deliquiate potash, will strike a bright purple colour through an equal mass of water. Odours are capable of a much wider diffusion. A single grain of musk has been known to perfume a large room for the space of twenty years. Consider how often, during that time, the air of the apartment must have been renewed, and have become charged with fresh odour! At the lowest computation, the musk had been subdivided into three hundred and twenty quadrillions of particles, each of them capable of affecting the olfactory organs. The vast diffusion of odorous effluvia may be conceived from the fact, that a lump of assafœtida, exposed to the open air, lost only a grain in seven weeks. Yet, since dogs hunt by the scent alone, the effluvia emitted from the several species of animals, and from different individuals of the same race, must be essentially distinct.

But the diffusion of the particles of light (if light has really particles) defies all powers of calculation. A small taper will illuminate the atmosphere to the distance of four miles; yet the luminous particles, which fill that wide concavity, cannot amount to the five thousandth part of a grain, which may be the whole consumption of the wax in light, smoke, and ashes.



CHEMISTRY.

To the youthful mind this is the most interesting, as it is the most useful, of the sciences. Its combinations are almost innumerable, and the effects produced seem almost supernatural; and those who have penetrated most deeply into its mysteries are loudest in its praise. Without attempting even an outline of this interesting and important science, we may find in it material for many amusing and instructive experiments adapted to the pages of this book. The apparatus requisite for those which are of special interest to boys is not very expensive. We know of none so simple and good as those of Mr. Statham, of the Polytechnic Institution, and of 111, Strand. The lowest price of these (consisting of a cabinet containing numerous

CHEMISTRY.





chemical preparations with useful implements) is 5s. 6d. Of course, such a collection cannot include all the articles of importance to the student, which are comprised in Mr. Statham's "Economic Laboratory," at the price of two guineas and upwards. Among the most necessary of these is the *Pneumatic trough*, especially useful for collecting gases and passing them from one vessel to another. A cheap substitute for this, on a small scale, will be found in the use of a common saucer, with a hole, a quarter of an inch in diameter, made in the centre by carefully breaking the glazed surface with a steel point, and working an aperture with a three-square file. Then with a pair of small pliers crumble away an arched piece of the edge of the saucer, about half an inch wide and the same in depth; invert the saucer in a wash-hand basin, and cover it with water. Fill a phial with water, and, putting the finger over the mouth, invert it on the aperture in the centre of the saucer: while it is held in that position, the pressure of the atmosphere on the water in the basin will keep the phial from discharging its contents. A curved or flexible tube attached at one end to the vessel from which you wish to extract the gas must now be passed through the arch under the edge of the saucer, and the gas, being the lighter element, will rise through the saucer into the phial, displacing the water.

When any piece of apparatus has been inadvertently broken, it does not necessarily follow that it is entirely useless; the student, to whom economy is an object of importance, *should see whether, by a little ingenuity, some new*

and useful utensil may not be made from the remains of the old one: for instance, a broken retort or flask may frequently be made into a very good evaporating dish, by taking a piece of thick iron wire, or a nail, heating it to redness, and applying the heated point to the end of a crack in the glass, drawing it very gradually in the direction in which it is required to be cut: the crack will always follow the iron, so that a piece of glass may be thus cut into any figure that is desired. The neck or tube may be often converted into some other useful article, with the assistance of the file and blowpipe. The above process will apply to the cutting of flat glass.

BOTTLES FOR EXTRICATING GASES, not requiring heat, may be constructed from large phials, by merely curving a tube, and connecting it to the bottle with a cork.



The largest chemical establishments could not furnish a

better apparatus than this for generating such gases as *hydrogen, sulphureted hydrogen, carbonic acid, and deutoxide of nitrogen.*

To ANSWER THE PURPOSE OF A RETORT, a Florence flask may be obtained at any of the oil-shops, and may be cleaned very easily either by a small quantity of strong sulphuric acid, or caustic potash in solution. The glass of which these flasks are made is extremely infusible, and (from its thinness) capable of bearing a very great heat.

Though these substitutes, for some of the apparatus, are useful, nothing can really be done in the way of chemical experiment without some instruments which it is impossible to improvise, while such as may be so constructed commonly answer but a partial and temporary purpose.

My young readers ought to know that nearly all substances are compounded of two or more ingredients, and that the number of those that are simple or elementary does not exceed sixty. If all substances were like these, there would be nothing for chemistry to do, it being the business of this science to discover of what elements everything is composed, and what relation they bear to each other.

The elementary or simple bodies are represented by contractions or symbols, and their specific gravity or weight in proportion to their bulk, as compared with each other, is represented by numbers. Hydrogen, being the lightest, is represented by 1, mercury, being the heaviest, is marked as 200—that is, 200 times as heavy as hydrogen.

ELEMENTARY BODIES.

NON-METALLIC.

| Names. | Symbols. | Equiv. | Names. | Symbols. | Equiv. |
|----------------|----------|--------|------------------|----------|--------|
| Oxygen . . . | O | 8 | Sulphur . . . | S | 16 |
| Hydrogen . . . | H | 1 | Selenium . . . | Se | 40 |
| Nitrogen . . . | N | 14 | Phosphorus . . . | P | 32 |
| Carbon . . . | C | 6 | Fluorine . . . | F | 19 |
| Chlorine . . . | Cl | 36 | Silicon . . . | Si | 22 |
| Iodine . . . | I | 126 | Boron . . . | B | 11 |
| Bromine . . . | Br | 78 | | | |

METALLIC.

| Names. | Symbols. | Equiv. | Names. | Symbols. | Equiv. |
|-----------------|----------|--------|--------------------|----------|--------|
| Potassium . . . | K | 40 | Tin . . . | Sn | 59 |
| Sodium . . . | Na | 23 | Cerium . . . | Ce | 46 |
| Lithium . . . | L | 7 | Uranium . . . | U | 60 |
| Barium . . . | Ba | 69 | Arsenic . . . | As | 75 |
| Strontium . . . | Sr | 44 | Antimony (Stibium) | Sb | 129 |
| Calcium . . . | Ca | 20 | Chromium . . . | Cr | 28 |
| Magnesium . . . | Mg | 13 | Vanadium . . . | V | 69 |
| Aluminum . . . | Al | 14 | Molybdenum . . . | Mo | 48 |
| Glucinum . . . | G | 27 | Tungsten . . . | U | 95 |
| Zirconium . . . | Zr | 34 | Tantalum . . . | Ta | 92 |
| Thorium . . . | Th | 60 | Tellurium . . . | Te | 66 |
| Yttrium . . . | Y | 32 | Titanium . . . | Ti | 24 |
| Manganese . . . | Mn | 28 | Osmium . . . | Os | 100 |
| Iron . . . | Fe | 28 | Mercury . . . | Hg | 200 |
| Zinc . . . | Zn | 32 | Silver . . . | Ag | 108 |
| Cadmium . . . | Cd | 56 | Gold . . . | Au | 199 |
| Cobalt . . . | Co | 29 | Platinum . . . | Pl | 99 |
| Nickel . . . | Ni | 30 | Palladium . . . | Pd | 53 |
| Copper . . . | Cu | 32 | Rhodium . . . | R | 52 |
| Bismuth . . . | Bi | 71 | Iridium . . . | Ir | 99 |
| Lead . . . | Pb | 104 | Lanthanum . . . | L | 48 |

CHEMICAL NOMENCLATURE.—The compounds of oxygen, chlorine, iodine, &c., are named oxides, chlorides, and iodides, if they are not acid.

The non-acid compounds of sulphur, phosphorus, and carbon, are called sulphurets, phosphurets, and carburets.

If oxygen combine with another body to form one or more acids, their names are derived from the acidified substance, with the addition of *ous*, or *ic*; the first expressing the compound containing the smallest proportion of oxygen. Thus, sulphur, phosphorus, and nitrogen, form

| | | |
|-------------------|-----|--------|
| Sulphurous . . . | and | acids; |
| Sulphuric . . . | | |
| Phosphorous . . . | and | acids; |
| Phosphoric . . . | | |
| Nitrous | and | acids. |
| Nitric | | |

those in the upper line containing less oxygen than those in the lower.

If there be but one acid, the termination is in *ic*. If there be three, that combined with the smallest quantity of oxygen is distinguished by the word *hypo*, signifying *under*, being prefixed; accordingly, we have *hypo-nitrous*, *nitrous*, and *nitric*, acids.

Proto, *deuto*, *bi*, *per*, and *sesqui*, are added to compounds to express their composition; as, *proto-chloride* of mercury, *proto-oxide* of manganese, *proto-sulphate* of iron: by which we understand, that these bodies contain respectively one

equivalent of chlorine, *one* of oxygen, and *one* of sulphuric acid. Again, *deuto*, or *bi*, signifies *two* equivalents of the substance which is first named in the compound; as, *deuto-chloride*, or *bi-chloride*, of mercury; *deuto-sulphate*, or *bi-sulphate*, of potash; implying the existence, in compounds so named, of *two* equivalents of chlorine, and *two* of acid. *Per* is used to express the greatest possible amount of a substance in a compound. Thus,—of all the compounds of oxygen and mercury, *per-oxide* of mercury contains the largest quantity of oxygen.

Frequently a metal cannot unite with more than two proportions of oxygen, which produces a confusion of names for the same substance; accordingly we find, that *per-oxide* *bin-oxide*, and *deuto-oxide* of copper, designate the same thing. The letter *n* is introduced in *bin-oxide* to avoid the collision of vowels. *Sesqui* means *one* and a *half*, and refers to those occasional deviations from the law of multiples, in which *half* an equivalent occurs. Thus: *sesqui-carbonate* of ammonia, and *sesqui-oxide* of manganese, are used to indicate that these compounds contain *one* and a *half* equivalents: the first, of carbonic acid; the second, of oxygen.

In naming *salts*, the final *ous* is changed into *ite*, and *ic* into *ate*; therefore, *sulphurous*, and *sulphuric*, acids, uniting with soda produce salts, of which the first is called a *sulphite*, and the second, a *sulphate* of soda. Acids consisting of hydrogen and another element have a name compounded of *both*; as *hydrochloric* acid, a compound of hydrogen and *chlorine*. The alkali in a salt is frequently termed the *base*.

It is most essential to bear in mind that success in chemical pursuits very much depends on the cleanliness of the apparatus ; since, it not unfrequently happens, that, after having spent hours upon an interesting experiment, the whole labour is lost, materials are wasted, and the ardour of the student damped, by not having previously attended to this necessary precaution.

As the experiments of greatest interest will be performed with gases, we will refer to them in the order in which they occur in the table of elementary bodies.

OXYGEN

Is one of the two constituents of water, of which the other is hydrogen. It is also the chief source of respiration in the atmosphere, one man absorbing 800 lbs. weight of it in a year. It is mostly extracted from some metallic oxide or salt, by the application of heat, and may be obtained in this manner :—Take 30 grains of chlorate of potass : pulverize and introduce it into a glass bulb-tube ; cork it and introduce a tube through the cork ; fix it in a holder, so that there shall be space under the bulb for a spirit-lamp, and let the open end of the tube dip under the saucer of the small pneumatic trough. To do this conveniently, the descending portion of the bent tube should be about nine inches long. In order to know whether the junction is air-tight, grasp the bulb with the hand, the warmth of which will expand the air within, and cause it to escape through the water, if the cork be securely adapted.

to the flask. The following diagram represents the manner in which this experiment is performed :—

Apply the flame of the spirit-lamp gradually, when the salt will first melt, and then, an effervescence will result from the extrication of oxygen, which may be collected in two-ounce phials ; when filled, they should be corked carefully *under water*, and their places occupied by others, till the action ceases. The heat required approaches low redness : be careful it is not too violent, as some of the chlorate would then be carried over mechanically, and give the gas a clouded appearance. Each grain of chlorate of potass will yield rather more than one cubic inch of oxygen.

In order to get the gas over more freely, and at a lower temperature, it has been found very advantageous to mix with the chlorate of potass one-sixth its weight of powdered peroxide of manganese. The peroxide of manganese in this experiment affords no oxygen, but merely acts mechanically, by separating the particles of chlorate of potass, and thus more easily distributing the heat throughout the mass, and preventing that rapid fusion of the salt which interferes with the extrication of the gas. A Florence flask, with a bent tube through the cork, would answer for this operation.

Oxygen has the power of supporting combustion. Take a splinter of wood, light it, and blow it out, leaving a small spark visible ; in this state introduce it into a phial full of the gas ; it will burst into a flame with a slight explosion. *This serves as a test for oxygen.*

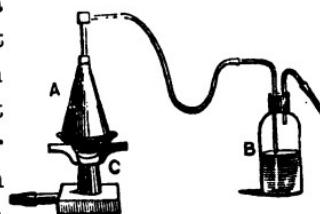
An intensely-brilliant light will be produced by insert-

ing into a vessel of oxygen gas a spiral coil of very thin iron wire, which has been heated and dipped into flower of sulphur, so as to coat it with that substance, and then lighted.

Oxygen has an affinity for potassium, which is shown in an interesting manner, by putting a piece of that metal into water, when combustion will take place.

HYDROGEN

Is the lightest substance in nature—is colourless and invisible—as commonly prepared, has a slight odour, which may be remarked by suffering a little to escape into the room; it has, however, no smell when pure—is highly combustible, but does not support combustion, nor the respiration of animals, though not injurious when breathed for a short period. It produces a *curious effect on the voice*, which may be thus shown:—



Make a hole through a wine cork of sufficient size to admit a smaller cork; through which make another hole and fix it into the larger one; tie them thus fixed into the neck of a bullock's bladder, previously exhausted of air; let a tube coming from a bottle generating hydrogen pass very tightly through the aperture in the small cork, and the gas will distend and fill the bladder. The instant it is full, withdraw the inner cork, and either prevent the escape of

the gas by means of the thumb, or cork it close, having previously provided a cork of proper size, till the operator is ready to *breathe the gas*; to do which, he should put the open cork into his mouth, and take *one* inspiration; when on immediately speaking, his voice will be *remarkably shrill*. The effect passes off in a few seconds.

Hydrogen in its nascent state has the power of combining with certain metals. This is the case, for instance, with arsenic, which unites with hydrogen to form a very poisonous gas, called arsenuretted hydrogen. This peculiar property of hydrogen has been laid hold of by Mr. Marsh, for the purpose of detecting the poisonous metal; and so delicate is this test, that, by its means, the half-millionth part of a grain of arsenic may be readily discovered. The zinc and sulphuric acid employed in the generation of hydrogen frequently contain small portions of arsenic, and to this may in some measure be ascribed the unpleasant odour occasionally given off from the gas.

It is derived from water, and may be obtained in large quantities, and with extreme facility, by the following process:—

Take a phial, put into it some pieces of zinc and diluted sulphuric acid; and having previously drawn out, by means of the spirit-lamp and blow-pipe, a piece of quill tube to a fine aperture, and fixed it in a cork, insert the cork in a bottle; wait about two minutes, or less if the action be rapid, for the expulsion of the air, and then apply a light; the hydrogen will burn with a pale flame, and constitute what

Dr. Priestley called his *Philosophical candle*: a common tobacco pipe will answer the purpose as well as the glass tube.

This, being the lightest of all gases, is most adapted for filling balloons, but the expensiveness of filling so large a machine with pure hydrogen, to say nothing of the difficulty of



procuring it in sufficient quantities, prevents its use for such a purpose. Before coal-gas was manufactured for lighting towns, &c., balloons were inflated by means of fires lighted under them to rarefy the air, which being thus expanded, filled the balloon with a lighter air. It was thus that the "Montgolfier balloon" was inflated; and by means of little

bundles of straw continually supplying a furnace in a recent ascent of a large balloon bearing that name, this new application of an old principle succeeded so as to make the machine rise majestically with its human freight, who, however, came to grief in their descent, which it was found impossible to regulate as in those inflated with coal-gas.

Small balloons, without risking life, may be sent up filled either with hydrogen or with coal-gas, which latter is composed of hydrogen and carbon, and is easily applied. A balloon in a human shape, with ballast to keep it upright, is an amusing experiment.

Almost every one is acquainted with the simple method of producing a jet of coal-gas through a tobacco-pipe, by filling the bowl with very small pieces of coal, and covering it with clay, inserting the bowl into the fire and lighting the gas, which is soon seen to issue from it as you often see it from the coal on the fire.

NITROGEN.

This gas, presenting but few interesting features, will be dismissed with a brief notice.

As it forms a large proportion of atmospheric air, the disengaging of the oxygen from it will of course leave the nitrogen. There is, however, an easier process which would get it sufficiently pure for most purposes, viz., by pouring nitric acid on minced raw beef in a retort, and collecting the gas in the usual manner.

Nitrogen is free from odour—is not soluble in water—

nor is it marked by any active property. Its name signifies *generator of nitre*, or *saltpetre*, of which it is a constituent; it is rather lighter than air, and constitutes four-fifths of its volume, and also forms part of ammonia.

PROTOXIDE OF NITROGEN, or laughing gas, is prepared as follows :—

Take two ounces of dry nitrate of ammonia, and put it into an oil-flask ; place the flask a little above a small charcoal fire, till nearly the whole of the salt is melted ; this will expel all the water, which, when present, is apt to embarrass a beginner. Remove the flask, and insert a cork with a bent tube ; arrange it at the pneumatic trough, re-apply heat, and collect the gas. Should the action be too rapid, interpose, between the flask and the fire, a sheet of tin plate, kept in readiness.

Prot oxide of nitrogen has a faint, though not disagreeable odour, and a sweetish taste. It may be breathed for a short time with safety ; and the result is curious : the person often laughs violently, and is much excited with pleasurable emotions. These effects, however, vary according to the temperament of the individual. It may be tried with a large bladder, filled in the manner pointed out under the head of hydrogen ; but should never be breathed by any one when alone.

CARBON.—The purest form of this substance is the Diamond charcoal. Plumbago, or black lead, is also a form of it.

CARBONIC ACID GAS

Is one of the most easily prepared, and is thus generated :— put fragments of marble into a gas bottle ; add to them muriatic acid, diluted with four or five times its bulk of water ; collect the gas over the pneumatic trough, and examine it first as to solubility. Half fill a bottle or tube with the gas, agitate briskly, and open *under water* ; it will be found that, at natural temperatures and pressures, the water will absorb its own measure of carbonic acid ; if, however, the pressure be doubled, it will take twice—if trebled, three times as much, as under common circumstances. It is owing to this property that *Soda Water* is impregnated, under high pressure, with five or six times its bulk of carbonic acid. Common air contaminated with this gas is fatal to life, and hence, it is well to caution every young chemist against using charcoal fires in close apartments, since the combustion of carbon always produces carbonic acid. There is, however, no fear if there is a chimney in the room, and a moderate supply of air by the door or window.

Carbonic acid is apt to collect in certain situations, as in the bottom of wells ; and the above facts explain why workmen are in the habit of lowering a lighted candle into them before they descend ; if the candle be drawn up again lighted, they judge it safe to go down.

Carbonic acid is composed of



which is its equivalent.

Carbonic acid is the substance known to miners as "*choke-damp*." It is always formed after an explosion of "*fire-damp*," by the union of the carbon of the carburetted hydrogen, with the oxygen of the air.

It is given off during fermentation, and therefore is abundant in brewers' vats, and has occasioned instant death to men descending into them.

In many parts this poisonous gas is given off from openings in the earth. This is the case in the Grotto del Cane, near Naples, and in the valley of the Upas in Java.

The density of carbonic acid admits of demonstration by a striking experiment. The weight of the gas is such that it may be poured like a liquid from one vessel to another, and a candle may be extinguished by letting the gas fall on it. A jar quite full of the gas should be slowly emptied, by gently inclining it till it is horizontal, close to a candle; then gently turn it over the candle, which will be extinguished; but the jug must not be at once inverted over the candle, as the horizontal direction the gas takes would carry it beyond.

Carbonic acid is, also, contained in air; we prove this by its action on lime-water, thus:—take a portion of quick-lime in powder, and mix it with half a pint of cold water; filter it through paper, and preserve it closely corked; place some of this solution in a saucer, and leave it exposed in a place free from dust; a white crust will form on the surface, which is carbonate of lime; the carbonic acid being

derived from the atmosphere, where it exists in very small though variable proportions; not averaging, at most, five parts in 10,000.

Put some lime-water into a glass; blow through it with a tube for one or two minutes; it becomes white and milky, owing to the carbonic acid, exhaled from the lungs, combining with the lime.—This explains the process of respiration; oxygen is absorbed into the blood; and carbonic acid, which is contracted during circulation, is given out; a change so necessary to life, that, if impeded but for a very few minutes, death is inevitable.

CHLORINE.

This gas, like carbonic acid, is of sufficient density to be poured from one vessel to another, being $2\frac{1}{2}$ times the weight of atmospheric air. It has an affinity for hydrogen, and rejects carbon—a property which may be thus illustrated:—if a lighted candle be plunged into this gas it burns with a smoky flame; the chlorine uniting with the hydrogen forms hydrochloric acid, and rejects the carbon, which shows itself as soot. Again,—dip a piece of thin paper, soaked in pure spirits of turpentine, into the gas, the turpentine bursts into a flame, hydrochloric acid is produced, and the jar is lined with a deposit of carbon. This gas is produced in the following manner:—take three *ounces* of muriatic acid, put it into a flask, and add half an *ounce* of peroxide of manganese in powder; make a very

secure junction with a cork and tube, and receive the gas over water. Half-pint, wide-mouthed, stoppered bottles should be used as receivers; but if these are not at hand, phials and corks must suffice. The gas may be collected over cold water; but, as it is freely soluble in this liquid, loss will be avoided by using the water warm, which will then dissolve only a small portion, in consequence of the elasticity of the gas being increased by a rise of temperature.

Another process for preparing chlorine is the following:—take half a dram of common salt, and half a dram of peroxide of manganese, and act upon them with two drams of diluted sulphuric acid, applying a very moderate heat with the lamp. Collect the product in small phials, or tubes, over the pneumatic trough.

In preparing chlorine the experimentalist must have all his receivers full of water, and standing in readiness; for, if any escape into the apartment, *it will be most injurious to the lungs.*

To introduce substance into gases a *deflagrating spoon* is required. It may be bought at a trifling expense; but one equally useful may thus be made:—

Take a piece of sheet copper rather larger than a six-pence, bend it into a shallow cup; twist four fine brass wires, each nine inches long, tightly together, leaving an inch at the extremities, which must be spread to grasp the copper cup in the same way as the strings of a balance support the scale-pan. To complete it, take a circular disk of sheet-lead the size of a penny-piece; make a hole

through the centre sufficiently large to admit the twisted wires, but, at the same time, retaining them firmly in their position. If any difficulty be encountered in making the wires rest in the lead by adhesion, the hole may be enlarged, the wire put in, and a fragment of solder, the size of a pea, be melted upon it with the blowpipe.

Put a fragment of dried *phosphorus*, weighing about four grains, into this spoon, and introduce it into another bottle of chlorine: the phosphorus will ignite instantaneously, producing a *bichloride* of phosphorus. Phosphorus requires to be used with great care: do not handle it, and especially avoid friction.

Take some Dutch gold leaf, and fold two or three leaves round the spoon; plunge it into a third bottle of gas, and it will ignite.

Fold a slip of filtering paper into a match five inches long; dip it in oil of turpentine, let it drain an instant; then drop it into a fourth bottle of gas; it will burst into a flame and deposit much carbon.

Mix equal measures of chlorine and hydrogen (taking care not to do it in the sunshine, which has the singular power of causing them to explode); put the mixture into a soda-water bottle, and apply a light; combination takes place with a loud report.

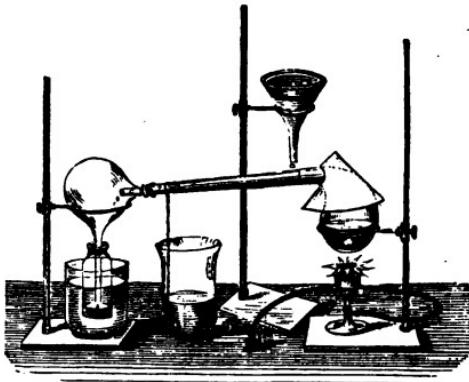
CHEMICAL ATTRACTION.

Take a solution of perchloride or bichloride of mercury, and add to it a few drops of solution of iodide of potassium.

In a moment there will be precipitated from the colourless liquid a most beautiful scarlet powder,—the new compound resulting from the attraction existing between the iodine of the iodide of potassium, and the mercury of the perchloride of that metal.

CHLORIDE OF COBALT.—Take a clean new quill pen and write with the solution of cobalt, on white paper; when dry, the marks will be scarcely perceptible; but on holding it to the fire, the writing becomes a bright blue.

These compounds are distinguished by their explosive properties, so that it is dangerous to prepare them in any quantity; we shall only illustrate the nature of two of them, the peroxide and chloric acid, by an experiment or two which may be performed with *perfect safety*.



Take a test tube, put into it three drops of concentrated sulphuric acid, and add four grains of powdered chlorate of

potass ; dip the tube in warm water ; it will be filled with a coloured gas, which is the peroxide of chlorine.

Bend a piece of wire eight inches long, at right angles three inches from the end, and stick on the shorter leg a small fragment of *dry phosphorus* ; hold it by the other leg, and introduce the phosphorus into the peroxide of chlorine, when it will cause an explosion. The same effect would be produced by the wire alone if it were heated.

MISCELLANEOUS EXPERIMENTS.

THE LEAD TREE.—Put half an ounce of sugar of lead, in powder, into a clean glass globe, wine decanter, or large phial, filled with water. Add ten drops of nitric acid, or a little vinegar, and shake the mixture well ; then take a small piece of zinc, about the size of a hazel-nut, tie it to a string which passes through a cork that fits the phial ; twist once or twice round the zinc a piece of fine brass or copper wire, and let the end of the wire depend from it in any agreeable form. Place the zinc and wire, thus prepared, so that it shall hang as nearly as possible in the axis of the bottle, and that no part shall touch either the top, bottom, or sides of it. Let the whole rest quietly for a short time. Metallic lead will soon deposit itself on the zinc, and along the wire, forming a brilliant illustration of chemical affinity. The zinc having a greater affinity for the acetic acid, which forms part of the sugar of lead, than the lead with which it is combined has, unites with it, and

suffers the lead to be deposited. The liquid will change to the acetate of zinc. The use of the nitric acid is to dissolve a white cloudy precipitate, often formed when sugar of lead is dissolved in common water, or if it contain of itself any impurity. Filtering will also remove the cloudiness.

CRYSTALLIZATION OF ALUM.—Let as much alum be dissolved in boiling water as it will take up, then introduce into the solution any substance which you wish to coat over.

In the animal kingdom, the lizard, large spider, grass-hopper, all the beetle kind, the nests of small birds, with their eggs, form beautiful specimens when neatly secured on portions of branches of the tree, &c., on which they are accustomed to roost. A considerable degree of attention is requisite to prevent too great a deposit of the alum on some of the above-mentioned subjects, by which their beauty would be obscured : they ought, therefore, to be frequently inspected while crystallization is going on, and removed as soon as it can be ascertained that they have acquired a sufficient coating. Various articles of turnery, &c., intended as chimney ornaments, in almost every diversity of form, if first carefully covered over with common cotton wound round them, may be submitted to crystallization with the same beautiful result.

The crystallized subjects may be tinged with almost any variety of colour, by boiling in the alum a solution of a little *indigo*, *Brazil wood*, *logwood*, *French berries*, or

other vegetable or mineral dyes. A little care and ingenuity will enable the operator to confine his tints to the crystal surrounding the flower-blossoms, and other particular parts of plants which he may wish to preserve.

A GALVANIC BATTERY IN THE MOUTH.—Take a flat piece of zinc, and suspend it between the upper lip and the gum ; place a half-crown or shilling on the tongue, taking care that both metals are wet. Then move the lower jaw sharply, so as to let the silver strike against the zinc. A galvanic flash across the eyes, and a singular metallic taste in the mouth, will attend every contact of the metals.

FUMIGATING PASTILES, INCENSE, &c.—Incense is made by putting a little powdered gum-benzoin into an earthen or metal pot, and dropping on this powder a coin or some other piece of metal that has been previously heated. This heat will make the gum yield a dense white fume, of itself very agreeable in odour ; which may be much improved by the addition of a little powdered frankincense, camphor, or Cascarilla bark. For the pastiles commonly used for scenting apartments, make a paste of the above ingredients by mixing them up with gum-water ; mould them into the usual shapes, and, after they are dried, they will be ready for use.

To RESTORE OBLITERATED WRITING.—To half a pint of pale sherry put six or eight of the whitest dyeing-galls, bruised ; let them stand in the sun about five days, and *then put the liquid on the defaced writing, and it will almost immediately revive it.*

To FIX BLACK-LEAD PENCIL DRAWINGS.—Dissolve a small quantity of isinglass, and dilute it with warm water, till the solution is so thin, that when spread upon paper, and dry, it shall be free from those sparkling particles which never fail to appear, if too thick. Take a broad flat camel-hair pencil, set in tin, fill it plentifully with the solution, and draw it slightly over the work intended to be fixed, once or twice, or according as the size of the picture may require: it must be very carefully done, to prevent disturbing the sharpness of the pencil work: when dry, it will be found to resist the effect of India-rubber. It is advantageous to sponge the back of the drawing.

INDELIBLE LABELS FOR FLOWER-GARDENS.—Use pieces of zinc, and slightly rub with pumice-stone the portion upon which it is intended to write the label. Write on it with a common lead pencil, and, after two or three days' exposure to the air, the writing will be indelible, as far as the effects of weather are concerned. When the labels become covered with dirt, they may be washed without detriment to the writing, which, however, may be renewed by a fresh application of the pumice-stone.

To TAKE INK-SPOTS, &c., OUT OF BOUND BOOKS.—First clean the surrounding parts from grease with warm water; then apply oxalic acid with a camel-hair brush. To clean the entire cover, a solution of tin may be used. Finish by washing with cold water.

ARTIFICIAL GLAZING.—As a covering for flower-beds, &c., nothing can be better than the varnish or solution of caout-

chouc, spread with a clean brush upon fine holland, not calico. When the linen is properly strained upon frames, it is as tight as a drum-head, and is no contemptible substitute for glass; indeed, its chastened light renders it sometimes preferable.

To CLEAN GILT FRAMES, SOILED BY FLIES, &c.—When the gilders have finished laying the gold on a frame, they varnish it all over with a thin coating of very pure gum-arabic (dissolved in water), using a camel-hair pencil. Whatever dust collects is, therefore, on the gum, and not on the surface of the gold, and may be removed by moistening the gum with a camel-hair brush; any other article would be too rough, and damage the gold underneath. The proper way to do it is, after dipping the brush in clean water, to wet a small portion of the frame with it, so as to dissolve all the gum on that part; then wash your brush in the water, and draw it between your finger and thumb, or between a fold of sponge, to take out the superfluous water. With the brush thus prepared, you may carefully sweep off the wet gum and dirt together, without injuring the gold. When you have finished the whole frame, let it stand till the next day; you must then varnish it all over with a thin coating of the palest gum-arabic you can procure, dissolved in clean water, or the gold will neither be protected nor clean again.

MINERAL CHAMELEON.—An amusing substance, called *Mineral Chameleon*, may be prepared with black oxide of manganese. Mix the oxide with three times its weight of

powdered nitrate of potass ; put it into a crucible till nearly half full ; raise it to a strong red heat for half an hour ; the nitrate will impart oxygen to the manganese, and convert it into an acid ; which, combining with the potass, will form the dark-green mass resting in the crucible. Take some of this substance reduced to powder, and place it in a glass vessel ; pour upon it a small quantity of water ; a dark-green solution will result : add more water ; shades of green, blue, purple, and ultimately red, will manifest themselves. Hence the name of *Mineral Chameleon*. These changes are owing to the successive production of two acids of manganese, the manganic and the permanganic, which form salts with the potass ; the colour depending on that which predominates.

BISMUTH.—A remarkable effect may be exhibited with this metal. Let any quantity be dissolved in nitric acid, and the solution poured into a sufficient quantity of water ; immediately the water takes the nitric acid and precipitates almost the whole of the bismuth as an insoluble trisnitrate, which, if heated with charcoal in a crucible, leaves the metal in a pure state. This process is employed to separate bismuth from other substances.

ETCHING ON GLASS.—On a piece of window-glass of convenient size, and covered with a thin coating of bees' wax, trace with a sharp-pointed instrument (penetrating to the glass) any design which may suggest itself ; put fluor spar coarsely powdered into a basin ; pour in strong sulphuric acid, and press the glass with the waxed side downwards.

close on its top ; then cover it with a cloth ; heat the basin in a kitchen oven ; sulphate of lime will be generated, and hydrofluoric acid disengaged, which, acting on the uncovered portion of the glass, corrodes and engraves it : remove the wax by means of the caustic potass. Very pretty drawings may thus be etched upon the glass, and they may be rendered more visible by dusting the outline with a little powdered vermillion.

To DRY GLASS BOTTLES OR OTHER VESSELS.—Having got rid of as much moisture as possible by the ordinary means, apply a gentle heat ; then introduce a long glass tube to the bottom of the vessel, and take two or three inspirations through it ; this will cause a current of dry air to rush through the flask, and if repeated sufficiently often, while it is moderately heated, a state of perfect dryness is produced.

EXPLOSIVE SUBSTANCE.—Take three parts of nitre, two of potass, and one of sulphur, all well dried, and mix them in a warm mortar ; place a little of this powder upon a plate of iron over a good fire : it blackens, melts, and explodes violently.

BENZOIC ACID.—The volatile properties of this acid are thus demonstrated :—Fasten a sprig of fresh rosemary, or any similar shrub, to the inside of a small bandbox near the top ; heat a thick tile, and having sprinkled it with benzoic acid, immediately place the bandbox over it ; the acid sublimed by the heat will condense in white vapours on the green leaves of the plant, giving it the appearance of crystals of frost.

HANDS DIPPED IN MELTED TAR.—Sir David Brewster, in his admirable letters on “Natural Magic,” relates a case of a workman who immersed his hand in tar at 220° with impunity, owing to the slowness with which it communicates its heat, arising from the abundant volatile vapour evolved carrying off the calorific in a latent state. It was said that the same experiment tried with a glove on would be followed by a dreadful burn.

The following experiments are extracted by permission from an excellent little work by Mr. Statham, 111, Strand.

EXP. 1. *Violet Electric Light.*—Strew some small lumps of fluate of lime upon a fire shovel or other surface of iron which has been heated nearly to redness, and in the dark they will emit a beautiful violet-coloured light. The same pieces will do for repeated experiments.

EXP. 2. *The Well of Fire.*—Drop one or two small pieces of phosphuret of lime into a tumbler of hot water. Bubbles of phosphuretted hydrogen gas will be disengaged, which will catch fire upon reaching the surface of the water. Perform this experiment in a dark room on the fire hob, that the unpleasant smelling gas may escape up the chimney.

EXP. 3. *The Floating Beacon.*—If a small piece of camphor be lighted and placed in a basin of perfectly clean water, it will dart about as if endowed with life; but if a drop of oil be poured into the water, it will immediately cease moving.

EXP. 4. *Subterraneous Fire.*—Make a composition of one part of steel filings, one part of sulphur, and two parts of

water. Put it into a phial, and bury it about six inches below the surface of the earth. In a short time, if the weather be warm, the earth will swell and burn, and throw up flame, which will form an aperture, out of which will be scattered a yellow and blackish dust.

EXP. 5. *Mimic Lightning*.—Place a little lycopodium in the palm of the hand, and transfer it thence into the narrow glass tube ; on blowing slightly through the tube, so as to project the lycopodium through the flame of a candle, it will make a long flash like lightning, for which purpose it is employed in the theatres. Powdered resin would produce the same effect.

EXP. 6. *The Miniature Volcano*.—Sprinkle a few drops of water on two or three crystals of nitrate of copper, and fold them up *tightly* and *rapidly* in a piece of tin-foil ; place upon a plate, and in a minute or two there will be a violent action attended with sparks, smoke, and a slight explosion.

EXPERIMENTS ON CRYSTALLIZATION.

EXP. 7. *Instantaneous Crystallization*.—Make a strong solution of sulphate of soda (a teaspoonful with an equal quantity of water), and cork it while hot in a small phial. Then put it away to cool. So long as the cork excludes the air the solution will not crystallize, but if, when the mixture is *quite cold*, the cork be removed, it will immediately *shoot into* beautiful satin-like crystals. This experiment *may be repeated* any number of times by immersing the

phial up to its neck in hot water to re-dissolve the crystals, corking tightly, and cooling as before. If the solution does not instantly crystallize, drop in one crystal of the sulphate of soda and it will do so.

EXP. 8. *Prismatic Windows.*—Make a strong solution of sulphate of soda, and thicken it with a clear solution of gum arabic; apply it warm with a brush or feather to office or other windows, and on cooling, it will cover the surface with prismatic diamond crystals, and answer the purpose of ground glass. When not required, it can easily be washed off again with hot water.

EXP. 9. *Geometric Crystals.*—Take a lump of alum and suspend it by a thread in a tumbler of water. Leave it untouched for some days, and then upon removing it, will be found a crystalline arrangement, presenting the appearance of geometrical figures, apparently carved out upon its surface.

EXP. 10. *The Giant Crystal.*—Make a saturated solution of alum (by pouring pounded alum into boiling water, and stirring it with a glass rod till it will not dissolve any more),* and when it is of sufficient strength to crystal-

* This and one or two of the preceding experiments would answer better if performed with larger quantities than could be conveniently included in the cabinet. But if the student feel disposed, he can purchase at the oilman's or druggist's, for a penny, sufficient alum, sulphate of soda (glauber's salts), or sulphate of magnesia (Epsom salts), to make the experiments on a much larger scale. In this case he had better provide himself also with an oil-flask (to be had at the old bottle shops).

lize, which may be told by Experiment 11, set it by in a saucer (covered with a sheet of paper to keep out the dust) in a cool place. In two or three days crystals will be formed. Pick out two or three of the largest of these, and boil down the others with the addition of some more powdered alum, till the solution is again fit for crystallizing. Wait till it is quite cold, and then put the selected crystals into another saucer, and pour the cold solution over them. Watch them as they increase in size every day, occasionally turning them with the glass rod, and when they seem to stop growing, feed them again (for the process has very much the appearance of feeding) with another saturated cold solution. By repeating this process two or three times, you will finally obtain one very magnificent giant crystal, which will have a perfect geometrical shape.

EXP. 11. *Test for Crystallizing.*—Whenever a solution fails to crystallize after being set aside in a cool place, you may reasonably infer that it is for want of proper evaporation. The general rule is to evaporate (boil down in an open vessel) till a pellicle or thin skin forms upon the surface of the solution. But the strength of a solution may also be decided by the following test:—Dip the glass rod into it

for a penny), which he can thoroughly clean with some washing soda and hot water. Mounting this upon the tripod stand, and using the spirit lamp or a small piece of candle, he will be able to carry on his crystallizing experiments on a very respectable scale.

and let one or two of the adhering drops fall upon a surface of glass. If upon cooling, they concrete, or become solid, you may depend upon the solution crystallizing when it becomes cool.

EXP. 12. *The Manufacturer.*—With the information obtained by the practice of the preceding experiments, and with the aid of the flask mentioned in the note, the student may now venture upon manufacturing his own salts. A halfpenny-worth of the following crude salts procured from the oilman, will, when crystallized, yield him an abundant stock of pure crystals to be dried upon blotting paper, and preserved for use:—saltpetre will crystallize into nitrate of potass, common salt into muriate of soda, copperas into sulphate of iron, white vitriol into sulphate of zinc, glauuber's salts into sulphate of soda, blue stone into sulphate of copper, common soda into carbonate of soda, and common pearl-ash into carbonate of potash.

EXP. 13. *Bed of Crystals.*—Make strong solutions, as in Experiment 7, of sulphate of magnesia, sulphate of copper, sulphate of soda, sulphate of iron, and alum, and pour them all into one large saucer. In a day or two they will all crystallize separately and in groups, but each salt may be distinguished by its peculiar shape and colour, and the whole will afford a beautiful appearance.

CRUCIBLE EXPERIMENTS.

EXP. 14. *Mechanical Mixture.*—To illustrate the difference between mere mechanical mixture, and chemical union.

take of steel filings, three parts, and of powdered sulphur, one part. If these be mixed ever so intimately on a piece of paper, there will be no union : the resulting mass will present a greyish appearance, in which the separate particles of steel and sulphur can easily be distinguished.

EXP. 15. *Chemical Union*.—But if the mixture, above formed, be placed in a crucible, and the crucible, by means of a pair of tongs, be bedded in a clear fire, as soon as the sulphur melts, there will be a violent action—the steel filings will glow with a *sudden* red heat, and the result will be a black compound (sulphuret of iron), differing widely from the original ingredients. This compound may be preserved for other experiments.

N.B. The crucible must be *gradually* cooled, after use, among the ashes.

EXP. 16. *Deflagration*.—Place a crucible upon the fire, and raise it to a full red heat; then make a mixture of nitrate of potash, with one-third as much powdered charcoal, and inject small portions of it at a time into the heated crucible. A brilliant deflagration, accompanied with a slight explosion, will ensue. There is no danger in performing this experiment.

EXP. 17. *Phosphorescent Shells*.—Place some thick oyster shells in a crucible, and cover them above and below with flakes of coal; in about half an hour take them carefully *out*, and hold them near a lighted candle, or expose them to the full light of day for a few minutes. If they be now removed to a dark place, they will be found to have ac-

quired phosphorescent properties, the outer parts occasionally shining with prismatic colours.

EXP. 18. *Plastic Sulphur for Seals.*—Enclose some sulphur in a crucible, and keep it upon the fire till it melts, and becomes thick and viscid like treacle; then pour it out into a basin of cold water, and it will be found to have acquired a red tint, and to be perfectly pliable and ductile. In this state it may be used to take impressions of seals, medals, &c.

EXPERIMENTS ON AFFINITY.

EXP. 19. *A Liquid from two Solids.*—Put into the mortar equal portions of acetate of lead and sulphate of soda, or alum. Powder and rub thoroughly, and the two solids will coalesce, forming a liquid.

EXP. 20. *A Solid from two Liquids.*—Powder a little resin, and enclose it in the test tube with about twice as much alcohol (spirits of wine); on agitation, the resin will disappear, being taken up by the spirit; but the addition of a little water will again precipitate it in a solid form.

EXPERIMENTS WITH THE TEST PAPERS.

EXP. 21. *Litmus Paper.*—The blue, or litmus paper, is used as a test for acids, detecting them when present, even in very small quantities, and showing their existence by a red stain. Take a narrow strip of the paper, and dip it into acetic acid (vinegar), or solution of tartaric acid, and it will be stained red.

EXP. 22. Turmeric Paper.—The yellow or turmeric paper is employed as a test for alkalies,* by which it is stained brown. Immerse a narrow strip into a solution of caustic potash, and a brown stain will be communicated.

EXP. 23. To make the Test Papers.—Turmeric paper :—soak a small quantity of turmeric in *boiling* water, strain off, dip slips of paper in, and dry. Litmus paper :—dissolve some litmus in water, or squeeze out the colour from violets, iris, or other blue flowers, dip and dry.

EXPERIMENTS ON DETONATION.

EXP. 24. Thunder Powder.—Powder *separately* in the mortar (cleaning after each powdering) four grains of chlorate of potash and two of sulphur; mix with the fingers upon paper, and put the powder on a shovel over the fire, and a loud report will be produced. There is no danger in this and the following experiments.

EXP. 25. Series of Reports.—Take a crystal of the chlorate of potash, and having powdered it in the mortar, throw in about half as much powdered sulphur; if the mixture be now rubbed forcibly with the pestle it will be accompanied by a series of crackling reports like the smacking of a carter's whip, attended with small flashes of light.

EXP. 26. Fulminating Powder.—This powder, which is perfectly harmless (since it will not detonate unless pur-

* The alkalies are soda, potash, and ammonia; and the four alkaline earths, barytes, strontian, lime, and magnesia. The caustic potash will require to be closely corked, and not handled with the naked fingers.

posely placed on the fire), is made by mixing five parts of nitrate of potash (powdered), three of sub-carbonate of potash (salt of tartar), and one of sulphur, intimately together. When a little of this powder is placed upon a shovel over the fire, it first begins to blacken, then melts, and finally explodes with a loud report, resembling the firing of a musket. A small portion only should be detonated at a time, on account of the noise.

EXPERIMENTS ON HEAT AND COLD.

EXP. 27. *Animated Water.*—Fill a saucer with water, and having thrown a piece of lighted paper into a wine glass, invert it hastily with the mouth downwards in the water. As the paper burns, it will rarefy the air, which will be expelled in bubbles, and the water in the saucer will ascend into the glass to supply its place.

EXP. 28. *Intense Cold.*—Take fine powder of muriate of ammonia five parts, of nitrate of potash five parts, and mix them with sixteen parts of water. The temperature of the mixture will be reduced so low, that if the test tube, with a little water in it, be used to stir it, the water in the tube will be converted into ice.

EXP. 29. *Ice before a Fire.*—Take a small saucepan, and having made a little pool of water upon a table or wooden stool, set the saucepan upon it; then throw in a handful or two of snow (or if in summer some powdered ice, to be had at the fishmonger's), and a handful of common salt; now stir with a stick or wooden spoon, and the cold generat-

will be sufficient to freeze the saucepan to the table or stool even before a large fire.

EXP. 30. *Rarefied Air*.—Procure a sheep's or pig's bladder, and having soaked it, blow in a little air, and tie up the mouth tightly with a piece of string. If the bladder be now laid before a fire, the enclosed air will be rarefied or expanded by the heat to such an extent as to fill the whole bladder; and if very thin, to burst it.

EXP. 31. *Water boiled by Cold*.—Put a small quantity of water into a Florence flask, and hold it over the flame of a candle till the water boils; then tie over the mouth quickly (while the flask is full of steam) with a piece of moist bladder. When this is the case, if you apply a strip of paper dipped in *cold* water to the upper portion of the neck, the steam will condense, forming a vacuum, and the water will recommence boiling; but if the strip of paper be dipped in *hot* water, steam will be formed again, and the water will cease boiling.

EXP. 32. *The Paper Crucible*.—Take a small round bullet and wrap it up tightly, and with as few wrinkles as possible, in some writing-paper. If this be properly managed, the bullet may be melted over a candle, till it makes a hole in the bottom of the paper, and runs out without the rest of the paper being burned.

EXP. 33. *Fire-proof Paper, &c.*.—Make a saturated solution of alum as in Experiment 10, and soak some paper and thread in it several times, drying thoroughly between each *immersion*. This will render these articles fire-proof. A

small ring may be suspended by a piece of the prepared thread, which, upon being exposed to heat, will, if it burn to ashes, still support the ring.

EXP. 34. *The Incombustible Thread.*—Select a smooth circular pebble, and twist some common thread tightly round it; the pebble may now be suspended by the disengaged end of the thread in the flame of a candle, without the thread being burned.

EXPERIMENTS ON BLEACHING.

EXP. 35. *Bleaching Liquid.*—Take some chloride of lime (to be procured at the druggist's for a penny), and stir it up thoroughly with about eight times as much water: allow it to settle, and filter off the clear liquor which constitutes bleaching liquid. Test its quality by dipping in a strip of litmus or turmeric paper, or any coloured calico.

EXP. 36. *The Bleached Rose restored.*—Procure a common red rose, and enclose it under a basin with some sulphur previously kindled in the tin capsule; the colour will be discharged, but may be recovered again by allowing the rose to lie in water a short time.

EXP. 37. *Stains removed.*—Take equal parts of citric and tartaric acid, powder them very fine, and mix well together; if a little of this powder be rubbed on any ink spots or other stains, they will be immediately removed.

MISCELLANEOUS EXPERIMENTS.

EXP. 38. *Test for Silver.*—Take a wine glass of water (which has been boiled and cooled) and drop in a minute

portion of the nitrate of silver. Be it ever so small, a solution of muriate of soda (common salt) will detect it, by throwing down a milky white precipitate of chloride of silver.

EXP. 39. *Crimson Flame*.—Put the tin capsule upon the tripod stand, and place in it a small quantity of the nitrate of strontian; then light the spirit lamp and place it underneath. This will, in a minute or two, thoroughly dry the powder. Blow out the lamp, and wait till the tin capsule is cold, then pour about a tea-spoonful of spirits of wine upon the powder, and kindle the spirit lamp again: if the spirits are now lighted and stirred up with the glass rod, they will burn with a beautiful crimson flame. The powder in this and the two succeeding experiments, when dried, will serve again.

EXP. 40. *Sympathetic Ink*.—Write on paper, with a clean quill pen, with a solution of acetate of cobalt: the letters will be invisible when cold, but on holding them before the fire, they will assume a blue tint, which will again disappear as the paper cools. A cheap ink, for the purposes of secret writing, is furnished by the use of common milk. If a solution of nitrate of silver be employed, the letters will be invisible till exposed to the light or fire, when they will turn permanently black.

EXP. 41. *The Wonderful Liquor*.—Boil a few chips of logwood in a little water so as to make a red solution; then take three glasses, and having rinsed out the first with vinegar, and the second with a solution of alum, on pour-

ing out the liquid it will be of a straw colour in the first; of a bluish black in the second; and of a red colour in the third.

EXP. 42. *Capillary Attraction.*—A mixture of oil and water may be again separated, by twisting up a small piece of lamp cotton, and allowing one end to dip in the oil, while the other, or longer end, is carried over into a cup or other vessel. The cotton should be previously soaked in oil for a minute or two, and the receiving vessel must be placed *below* the phial; the oil will then gradually come over, drop by drop.

EXP. 43. *Photogenic Drawing.*—Make a solution of nitrate of silver, and brush it over the surface of some writing-paper; dry it in a *dark* closet, and then brush it over in a similar manner with a solution of common salt; again dry it in the dark, and your paper will be prepared. Procure a piece of lace, a fern leaf, or other object, and putting it upon the prepared paper, cover the whole with a piece of common glass, and expose it to the light of the sun, or the daylight. The chloride of silver, formed by the above process on the paper, will gradually become purple where exposed, and will thus, upon removing the patterns, present a perfect representation of them, in white, upon a purple ground. The drawing may be fixed by a solution of hypo-sulphite of potash.

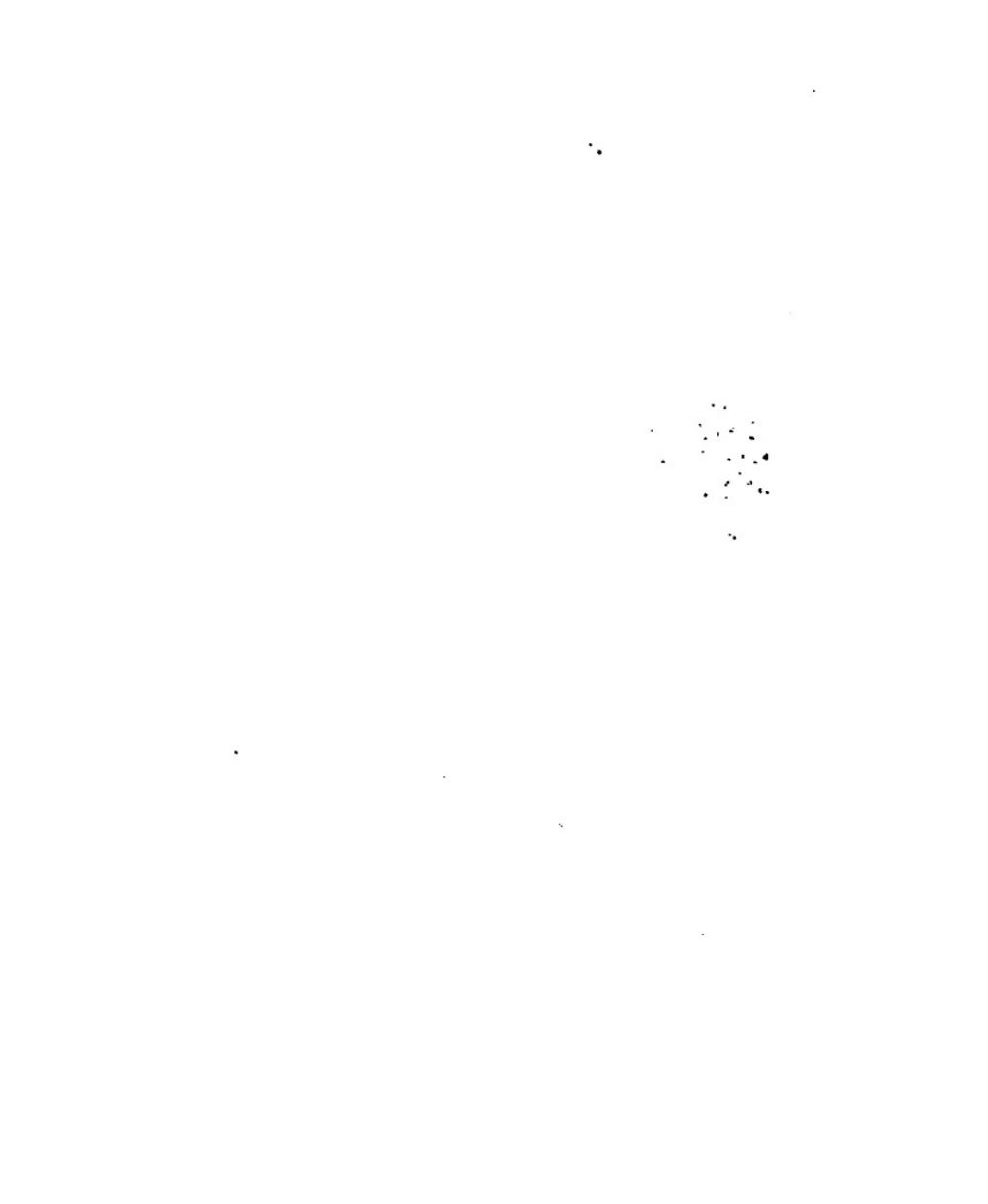
EXP. 44. *The Egg in a Bottle.*—An egg may be made to go inside of a bottle, by immersing it in strong vinegar till the shell is softened. When it is introduced, the bottl

may be filled with water, which will restore to the shell its primitive hardness.

Exp. 45. *Coin melted in a Nut-shell.*—Make a mixture of three parts of nitrate of potash (thoroughly dried in the tin capsule), one part sulphur, and one of fine dry sawdust; lay a portion of this powder in the bottom of a walnut-shell, and having rolled up a thin silver or copper coin, place it in, and fill up to the surface (ramming it down tight) with more of the mixture: if the powder be now set on fire the coin will be found melted in the bottom of the shell.

Exp. 46. *Fire under Water.*—Take of nitrate of potash, one part; of gunpowder, three parts; and of powdered sulphur, three parts: mix them well together and put them into a phial, or pasteboard case; then hastily kindle a small portion at the mouth, and immerse it under water. It will continue to burn till quite consumed.

Exp. 47. *Photogenic Printing.*—Take a piece of window-glass, and having mixed a little lamp-black, or fine soot, with some bees'-wax, melt it, and pour a thin coating over one surface of the glass; if drawings or writings be now traced upon the wax with a needle, so as to allow the light to pass through the lines formed, any number of copies may be struck off, by placing sheets of the prepared photogenic paper underneath (See Experiment 43), and exposing them for a day or two to the action of the light.



FIREWORKS.



FIREWORKS.

THE art of making these, it is said, has been practised among the Chinese for many ages—with Europeans it is of comparatively modern date. The Italians and French are celebrated for the taste and splendour of their pyrotechnic exhibitions ; and the displays we witness in this country show that, when circumstances call the art into exercise, we can form magnificent combinations and devices, in no respect inferior to those of our continental neighbours.

The prime materials of this art are gunpowder, nitre, sulphur, and charcoal, along with filings of iron, steel, copper, zinc, and resin, camphor, lycopodium, &c. Gunpowder is used either in grain, half crushed, or finely ground, for different purposes. The longer the iron filings, the brighter red and white sparks they give ; those being preferred which are made with a very coarse file, and quite free from rust. Steel filings and cast-iron borings contain carbon and afford a more brilliant fire, with wavy radiations. Copper filings give a flame of a greenish tint ; those of zinc, a fine blue colour ; the sulphuret of antimony gives a different blue, but with much smoke ; amber affords a yellow fire, as well as colophony and common salt ; but the last must be very dry. Lamp-black produces a very red colour with gunpowder, and a pink with nitre in excess : it serves for making golden showers. The yellow sand, or glistening mica, communicates to fireworks golden radiations. Verdigris imparts a pale green ; sul-

phate of copper and sal-ammoniac, a palm-tree green. Camphor yields a very white flame and aromatic fumes, which mask the bad smell of other substances. Benzoin, or Benjamin, and storax, are used also on account of their agreeable odour. Lycopodium burns with a rose colour and a magnificent flame; but it is principally employed in theatres to represent lightning, or to charge the torch of a Fury.

OF SULPHUR, OR BRIMSTONE.—Sulphur being one of the principal ingredients in gunpowder, and almost in all compositions of fireworks, great care ought to be taken to have it good. If it be of a bright yellow, and crackles and bounces when held in the hand, it is fresh and good; but as the method of reducing brimstone to a powder is very troublesome, for small fireworks the sulphur may be bought in flour; taking care, of course, to get it at a good shop: for the larger kinds, however, the lump brimstone, ground, is preferable.

OF CHARCOAL.—Charcoal is a preservative, by which the saltpetre and brimstone are made into gunpowder, by preventing the sulphur from suffocating the strong and windy exhalation of the nitre. Charcoal, for fireworks, must be soft and well burned. It may always be bought fit for use, and it is therefore only necessary to give this direction for selecting it.

OF SALTPETRE.—If this ingredient be not well cleansed from all impurities, and of a good sort, your works will *not have* their proper effect. To pulverize saltpetre, take

a copper kettle, the bottom being spherical, and put into it fourteen pounds of refined saltpetre, with two quarts or five pints of clean water; then put the kettle on a slow fire, and when the saltpetre is dissolved, if any impurities arise, skim them off, and keep constantly stirring it with two large spatulas, till all the water exhales: when done enough, it will appear like white sand, and as fine as flour; but if it should boil too fast, take the kettle off the fire, and set it on some wet sand, which will prevent the nitre from sticking to the kettle. Be careful to keep it in a dry place.

To MAKE THE CASES.—*Squibs or Serpents.*—Take a roller about six inches long, and about a quarter of an inch diameter (a lead pencil will do very well). Round this wind about seven thicknesses of stout brown paper. Half an inch of the paper must be below the bottom of the roller. Round this small end of the paper you must tie some string very tightly; this forms the bottom of the case. Then paste a piece of white paper round the case: dip the tied end in a varnish made of sealing-wax, one stick; rectified spirits of wood naphtha, $\frac{1}{2}$ pint. When dry, your case is ready. It will greatly improve them if you ram a pellet of clay to the bottom of them.

Star Lights and Blue Lights are made by merely winding two or three thicknesses—for starlights, of starred paper; for blue lights, of white paper—round a roller thinner than the one for squibs, and are to be tied up in the same way.

Roman Candles.—The cases for these must be made very strong. They are made on a roller about a foot long, and

inch in diameter (a ruler will do), and must have a dozen thicknesses of brown paper soaked in paste. They must be strongly tied at the bottom, and have an inch of the bottom filled tightly with clay. White paper to be pasted over all.

Flower-pots.—The roller must be six inches by one. The paper to be rolled about six times. You need not tie these, but ram a pellet of clay to the bottom. The cases for these are to be choked like rockets.

Small Sky Rockets.—(We, however, recommend that these should be bought). The cases are to be made in the same way as for flower-pots, only stouter, and instead of clay, the white paper with which they are covered is to be tied when the case is filled about an inch from the end.

To choke Cases.—You must have two rollers, one three inches long, the other a few inches more than the rest of the length of the case; these are to be connected by a short spindle fitting into each. The ends of the rollers to be rounded next the spindle.

Round the roller made thus, you must put the case when wet. In the end of a long piece of string tie a loop in which to put your foot. Wind the middle of the string once round the case where the spindle is, tie the other end to some convenient place above your head; then, by pressing down your foot in the loop, you will narrow the opening of the case where the spindle is. This is called the choke. Tie some string tightly round the choke. When dry, cut the case within half an inch of the choke.

Gerbs.—The cases for these, the same as for Roman candle; but choked as for rockets, and no clay made use of.

Touch-Paper.—Into half a pint of hot water put a tea-spoonful of saltpetre. When dissolved put in your blue paper to soak. This paper when dry is ready for use.

INGREDIENTS.

SQUIBS AND SERPENTS.

| | Parts. |
|-----------------------|--------|
| Meal Powder | 4 |
| Saltpetre | 2 |
| Charcoal | 1 |

STARLIGHTS.

| | |
|-------------------------|---|
| Saltpetre | 2 |
| Sulphur | 1 |
| Steel-filings | 2 |

BLUE LIGHTS.

| | |
|---------------------|---|
| Saltpetre | 2 |
| Sulphur | 1 |

ROMAN CANDLE COMPOSITION.

| | |
|-------------------------|---|
| Saltpetre | 2 |
| Meal Powder | 4 |
| Steel-filings | 1 |

FLOWER-POTS.

| | |
|-------------------------|---|
| Meal Powder | 4 |
| Saltpetre | 2 |
| Steel-filings | 2 |

SMALL ROCKETS.

| | Parts. |
|---------------------|----------------|
| Saltpetre | 4 |
| Sulphur | 1 |
| Charcoal | $1\frac{1}{2}$ |

GERBS.

| | |
|-----------------------|--------------------|
| Meal Powder | $1\frac{1}{2}$ lb. |
| Iron Sand | 5 oz. |

To FINISH—*Squibs or Serpents*.—Take a squib-case, and in it ram tightly down a thimbleful of gunpowder to make the report. You then by degrees fill in the composition, ramming it at every fresh quantity added: when full, point it with touch-paper.

Starlights and Blue Lights.—In filling it, ram very carefully, or you may burst the case.

Roman Candles.—Ram in a little gunpowder, then put in a star not quite so large as the diameter of the case, made by moistening some Bengal Fire with gum arabic, and let to dry. Then ram in about $1\frac{1}{2}$ inch of composition, then some more powder, and another star, and so on till full. They are to be let off, stuck in the ground, in a garden-pot or candlestick. Observe, also, to let the quantity of powder at the bottom of each ball increase as the balls increase in diameter, or as they come nearer the top of the case; not on account of the additional weight of the ball, but as on those balls situate near the top the force of the powder ceases to act sooner than on those situate lower in the case; consequently, the force to throw the ball to the same

distance must increase proportionably. Another reason for decreasing the quantity of powder towards the bottom is, that the same quantity used with the bottom as with the top ball would cause the case to burst, and destroy all the effect which they are intended to produce.

Small Sky Rockets.—Put in enough composition to fill an inch of the case. Then put in the same quantity of composition again, and ram that down in the same manner, and so on till the case is filled. Then put in a piece of paper as wadding. When this is rammed down and firm, bore with a *brass* bradawl three or four holes through it: these holes serve to make the requisite communication between the two parts of the rocket. (It ought always to be borne in mind, that iron tools must never be used in making fireworks of any kind, as they are liable to throw out sparks when striking against a hard stony substance; besides which, the sulphur used would soon combine with the iron, and render it brittle. Brass may be used, but still better, copper tools.) The rocket is now rammed, and may be taken out of the mould, set aside, and another rammed in like manner.

The cavity left at the top of the rocket is now to be filled. If the rocket be small, the charge of half an ounce of gunpowder is put into it, and the end fastened up; or, in larger rockets, stars or fiery rains are placed in the cavity, with a little loose gunpowder sprinkled over them, and the end fastened down, either by turning down some more of the paper of the case, or in any other convenient manne-

there should now be placed upon the top of the whole a conical cap, which, by cleaving the air, assists the rocket in rising into it.

The rocket is now supposed to be closed at one end. It only requires to be primed at the other, and that, it will be observed, is the end which was choked, and which is still open, and has a hole passing up it which the *piercer* occupied. To prime it, fill up the hole with loose gunpowder, and paste a piece of touch-paper over it.

Next fasten the stick to the rocket by two pieces of string tied round them. The stick must be of such a length that it will balance across your finger where the mouth of the case touches it.

Gerbs.—This firework is fixed in the ground, and throws up a beautiful jet of flame. They are filled from the bottom ; but you must be careful, before you commence ramming, to plug up the aperture of the neck with a piece of wood fitted to its diameter ; for if this is not done, the composition will fall into the neck, and leave a vacancy in the case, which will cause it to burst as soon as the fire arrives at that part of it.

You must observe, too, that the first ramming or two be of some weaker composition than the body of the case. When filled, the plug must be removed, and the neck filled with some slow charge, and capped with touch-paper ; a foot of wood is afterwards to be fixed to the gerb, and well secured, either by a cylinder fixed to the outside of the case, or by having in it a hole, into which the case may

be inserted : when either of these methods is employed, the foot must be firmly attached.

Mines.—This firework, which is very pretty, and costs about two shillings to buy, may thus be made for less than sixpence :—

Into a half-pint chocolate canister, put a small tissue bag which exactly fits the bottom, with half an ounce of gunpowder in it ; the top of this is to be moistened with a little wet gunpowder. You then put in three dozen small squibs about three inches long, with their mouths downwards, and no touch-paper on them. Cut off the bottom of a squib which is longer than the depth of the canister, and place it in the canister with the bottom touching the bag of gunpowder. You then fill all up with paper cuttings. The large squib first goes off, and, spitting out of the opening at the bottom, ignites the gunpowder and blows all the little squibs into the air.

Jack in the Box.—Made in the same way, using crackers instead of squibs.

Crackers.—It is very difficult for an amateur to make these. But for those who think they can manage it, we give the following directions :—Cut some cartridge-paper into pieces $3\frac{1}{2}$ inches broad, and 1 foot long ; one edge of each fold down lengthwise about $\frac{3}{4}$ of an inch broad ; then fold the double edge down $\frac{1}{4}$ of an inch, and turn the single edge back half over the double fold ; then open it, and lay all along the channel which is formed by the folding of the paper some meal-powder ; then fold it over and over till all

the paper is doubled up, rubbing it down every turn ; this done, bend it backwards and forwards, $2\frac{1}{2}$ inches or thereabouts at a time, as often as the paper will allow ; then hold all these folds flat and close, and with a small pinching cord give one turn round the middle of the cracker, and pinch it close ; then bind it with packthread as tight as you can ; and in the place where it was pinched, prime one end of it, and cap it with touch-paper. When these crackers are fired, they will give a report at every turn of the paper : if you would have a great number of bounces, you must cut the paper longer, or join them after they are made ; but if they are made very long before they are pinched, you must have a piece of wood with a groove in it, deep enough to let in half the cracker : this will hold it straight while it is being pinched.

Marroons.—These fireworks go off with a tremendous report, like a cannon. They must be fired by a light tied to the end of a stick 12 feet long, to prevent accidents. Formers for marroons are from $\frac{1}{4}$ of an inch to $1\frac{1}{2}$ diameter. Cut the paper for the case twice the diameter of the former, broad, and long enough to go three times round ; when you have rolled a case, paste down the edge, and tie one end close ; then with the former drive it down to take away the wrinkles, and make it flat at bottom ; then fill the case with corn powder, 1 in. diameter and $\frac{1}{4}$ high, and fold down the rest of the case tight on the powder. The maroon being thus made, wind packthread up in a ball, then unwind two or three yards of it, and that part which is near

the ball make fast to a hook; then take a marroon, and stand as far from the hook as the packthread will reach; take some ropeyarn and wind it lengthwise round the marroon as tight as you can, till it will hold no more that way; then turn it, and wind the packthread on the short way, then lengthwise again, and so on till the paper is all covered; then make fast the end of the yarn and beat down both ends of the marroon to bring it into shape. To consolidate the whole, dip it into thin varnish. To fire, bore a hole at one end with a brad-awl, and insert a piece of a cracker with a long touch-paper point.

Snakes are generally made about 5 or 6 inches long, and about an inch in diameter. The name which they bear probably arose from the hissing noise which they make when fired, or from the zigzag or vibrating directions in which they move when properly constructed. The cases must be made as for squibs. Fill the case with the following composition: mealed powder, 1 lb.; saltpetre, 1 $\frac{1}{4}$ oz.; charcoal, 1 oz.

COLOURED FIRES.

In making coloured fires, mind that your ingredients are well mixed. Great care must be taken in using chlorate of potash, as it is apt to ignite by friction: it should be powdered in small quantities at a time, and mixed with the other ingredients at the last. Nitrate of strontia must be fused before using. To do this, put it into a melting-ladle or iron pot on the fire; it first begins to bubble up

and then subsides : it is then to be taken off the fire and ground fine, when it is ready for use.

BENGAL FIRE

(a very brilliant white fire).

| | Parts. |
|---------------------------------|--------|
| Nitre | . 4 |
| Sulphur | . 2 |
| Sulphuretted Antimony | . 1 |

BLUE FIRE

(to be made a few hours before using, as it ignites spontaneously if kept long).

| | |
|------------------------------|-----|
| Sulphate of Copper | . 1 |
| Sulphur | . 1 |
| Chlorate of Potash | . 2 |

WHITE FIRE.

| | |
|-----------------------------------|------|
| Nitre | . 24 |
| Sulphur | . 7 |
| Red Sulphate of Arsenic | . 2 |

RED FIRE.*

| | |
|---------------------------------|-----|
| Nitrate of Strontia | . 8 |
| Chlorate of Potash | . 1 |
| Sulphur | . 3 |
| Sulphuretted Antimony | . 1 |

* If mixed with one-third its weight of chlorate of potash, and moistened with gum arabic, it makes a good red star for Roman candles or rockets. All the other coloured fires, if mixed with gum arabic, will make stars as well.

GREEN FIRE.

| | Parts. |
|------------------------------|---------------|
| Nitrate of Baryta | 12 |
| Chlorate of Potash | $\frac{3}{4}$ |
| Charcoal | 1 |
| Sulphur | 3 |

To MAKE A FIRE BALLOON.—These are very simple and very effective. Take two sheets of red tissue paper; two of deep yellow, and two of blue. Unfold them, and split them in halves the longest way of the paper. Take six of the pieces, and crease each of them in the middle longwise. Then with each piece so doubled commence cutting half-way between the crease and the edge. *Curve* your cut to the corner *away from the crease* of the opposite end. You will thus form an arch with just the extreme top flat.

Take the six pieces so formed, and gum them edge to edge longwise. This will form the top part of the balloon, but will require a round piece of paper gummed on the top to fill up the hole.

Take the remaining six pieces, and commence cutting at one-third the distance from the crease to the edge *straight* across to the opposite corner. Gum these pieces edge to edge. Join top and bottom with a band of paper. Make a cane hoop of such size as to be fixed about two inches from the bottom. Fix to this hoop, before attaching it, two diameters of wire at right angles to each other. Where they meet, fix a piece of sponge or tow soaked in methylated spirits. Set light to the tow, taking care not to let

the balloon take fire. Hold it down until it be well inflated. N.B. Care should be taken to gum pieces of paper over any little holes.

PELLET GUNS.

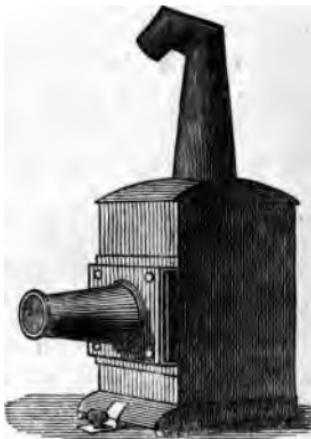
PELLET-GUNS are usually made of a piece of elder-tree, about an inch thick, with the pith extracted. A piece of ash or other strong wood is then cut small enough to enter the tube, and to reach within half an inch of the top, with a shoulder of similar dimensions to the tube itself, to prevent it going too far. A pellet of chewed tow is then inserted into the tube and pushed to the farther end. Another is inserted, and, being pushed, compresses the air between the two pellets, driving the first out, which may be picked up to do the same service for its fellow.

A pretty variety of this toy, and easily made, is the *potato-gun*. Take a strong quill, and cut as long a tube as you can get. Make a plug stick of the same shape as that of the ordinary pellet-gun; then cut a potato into slices, about a sixth of an inch in thickness; pass the wide end of the quill through one of these, and, having pushed the pellet to the top, make another in the same way.

THE MAGIC LANTERN.

THIS is one of the most pleasing of all optical instruments, and it is used to produce enlarged pictures of objects, which

being painted on a glass in various colours, are thrown upon a screen or white sheet, placed against the wall of a large room. It consists of a sort of tin box, within which is a lamp, the light of which (strongly reflected by the reflector) passes through a great plane-convex lens fixed in the front. This strongly illuminates the objects which are painted on the slides of the glass, and placed before the lens in an inverted position; and the rays passing them and the lens, fall on a sheet, or other white surface, placed to receive the image. The glasses on which the figures are drawn are inverted, in order that the images of them may be erect.



PAINTING THE SLIDES.

The slides containing the objects usually shown in a magic lantern are to be bought of opticians with the lantern, and can be procured cheaper and better in this way than by any attempt at manufacturing them. Should, however, the young optician wish to make a few slides representing objects of particular interest to himself, he may proceed as follows:—

Draw first on paper the figures you wish to paint, taking care they are the proper size; lay the drawing on the table, cover it with a piece of glass of this shape, and draw the outlines with a fine camel's hair pencil in black paint mixed with varnish; when this is dry, fill up the other parts with the proper colours, shading with bistre also mixed with varnish. The transparent colours are alone to be used in this kind of painting.

The room for the exhibition ought to be large, and of an oblong shape. At one end of it suspend a large sheet so as to cover the whole of the wall. The company being all seated, darken the room, and placing the lantern with its tube in the direction of the sheet, introduce one of the slides into the slit, taking care to invert the figures; then adjust the focus of the glasses in the tube by drawing it in or out as required, and a perfect representation of the object will appear.

Most extraordinary effects may be produced by means of the magic lantern; one of the most effective of which is a

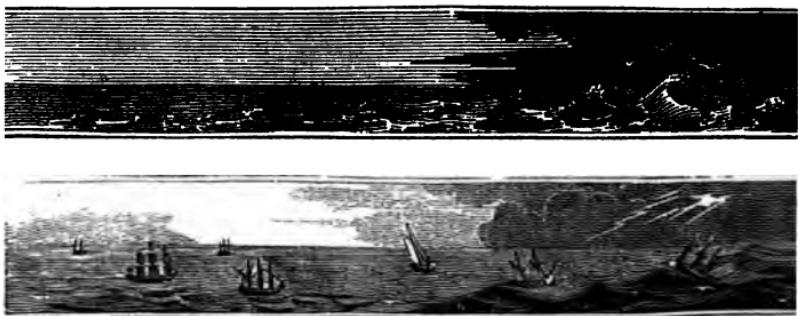
TEMPEST AT SEA.

This is effected by having two slides painted, one with the tempest as approaching on one side, and continuing in intensity till it reaches the other. Another slide has ships painted on it; and while the lantern is in use, that containing the ships is dexterously drawn before the other, and represents *ships in the storm*.

The effects of sunrise, moonlight, starlight, &c., may be

imitated, also, by means of double slides, and figures may be introduced sometimes of fearful proportions.

Heads may be made to nod, faces to laugh, eyes to roll,



teeth to gnash ; crocodiles may be made to swallow tigers ; combats may be represented ; but one of the most instructive uses of the slides is to make them illustrative of astronomy, and to show the rotation of the seasons, the cause of eclipses, the mountains in the moon, spots on the sun, and the various motions of the planetary bodies, and their satellites.

THE PHANTASMAGORIA.

Between the phantasmagoria and the magic lantern there is this difference ; in common magic lanterns the figures are painted on common transparent glass, consequently the image on the screen is a circle of light, having figures upon

it; but in the phantasmagoria all the glass is made opaque, except the figures, which, being painted in transparent colours, the light shines through them, and no light can come upon the screen except that which passes through the figure.

There is no sheet to receive the picture, but the representation is thrown on a thin screen of silk or muslin placed between *the spectators and the lantern*. The images are made to appear approaching and receding by removing the lantern further from the screen, or bringing it nearer to it. This is a great advantage over the arrangements of the magic lantern, and by it most astonishing effects are often produced.

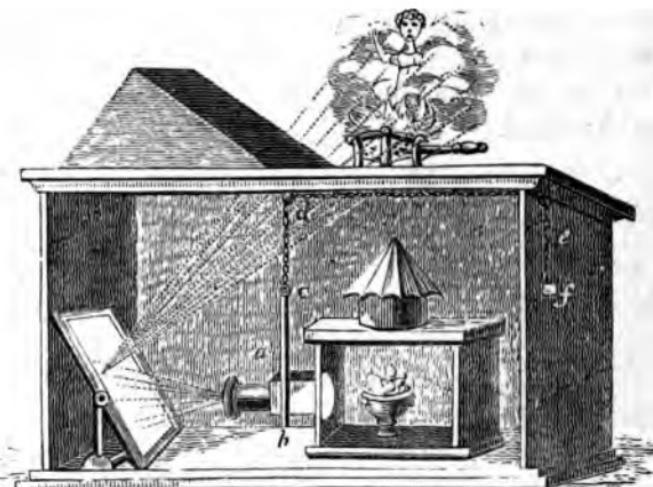
DISSOLVING VIEWS.

The dissolving views, by which one landscape or scene appears to pass into the other while the scene is changing, are produced by using two magic lanterns placed side by side, and that can be a little inclined towards each other when necessary, so as to mix the rays of light proceeding from the lenses of each together, which produces that confusion of images in which one view melts as it were into the other, which gradually becomes clear and distinct.

HOW TO RAISE A GHOST.

The magic lantern, or phantasmagoria, may be used in a number of marvellous ways, but in none more striking than in raising an apparent spectre. Let an open box, *a b*, about three feet long, a foot and a half broad, and three

eet high, be prepared. At one end of this place a small swing dressing-glass, and at the other let a magic lantern be fixed with its lenses in a direction towards the glass.



A glass should now be made to slide up and down in the groove *c d*, to which a cord and pulley should be attached, the end of the cord coming to the part of the box marked *a*. On this glass the most hideous spectre that can be imagined may be painted, but in a squat or contracted position, and when all is done, the lid of the box must be prepared by raising a kind of gable at the end of the box, *b*, and in its lower part, at *e*, an oval hole should be cut sufficiently large to suffer the rays reflected from the glass to pass through them. On the top of the box, *f*, place a

chafing-dish, upon which put some burning charcoal. Now light the lamp, *g*, in the lantern, sprinkle some powdered camphor or white incense on the charcoal, adjust the slide on which the spectre is painted, and the image will be thrown upon the smoke. In performing this feat the room must be darkened, and the box should be placed on a high table, that the hole through which the light comes may not be noticed.

THE THAUMATROPE.

THIS word is derived from two Greek words, one of which signifies *wonder*, and the other *to turn*. It is a very pretty, philosophical toy, and is founded upon the principle in optics, that an impression made upon the retina of the eye lasts for a short interval after the object which produced it has been withdrawn. The impression which the mind receives lasts for about the eighth part of a second, as may easily be shown by whirling round a lighted stick, which, if made to complete the circle within that period, will exhibit, not a fiery point, but a fiery circle in the air.

THE BIRD IN THE CAGE.

Cut a piece of cardboard of the size of a penny piece, and paint on one side a bird, and on the other a cage; fasten two pieces of thread, one on each side, at opposite points of the card, so that the card can be made to revolve by twirling the threads with the finger and thumb; while

the toy is in its revolution, the bird will be seen within the cage. A bat may in the same manner be painted on one side of the card, and a cricketer upon the other, which will exhibit the same phenomenon, arising from the same principle.

CONSTRUCTION OF THE PHANTASMASCOPE.

The foregoing figure is a Thaumatrope, as much as the one we are about to describe, although the term Phantasmoscope is generally applied to the latter instrument; which consists of a disc of darkened tin-plate, with a slit or narrow opening in it, about two inches in length. It is fixed upon a stand, and the slit placed upwards, so that it may easily be looked through. Another disc of pasteboard, about a foot in diameter, is now prepared and fixed on a similar stand, but with this difference, that it is made to revolve round an axis in the centre. On this pasteboard disc, paint in colours a number of frogs in relative and progressive positions of leaping; make between each figure a slit of about a quarter of an inch deep; and when this second disc is to be made to revolve at a foot distance behind the first, and the eye is placed near the slit, the whole of the figures, instead of appearing to revolve with the disc, will all appear in the attitude of leaping up and down, increasing in agility as the velocity of the motion is increased. It is necessary, when trying the effect of this instrument, to stand before a looking-glass, and to present the painted face of the machine towards the glass.

A very great number of figures may be prepared to produce similar effects—horses with riders in various attitudes of leaping, toads crawling, snakes twisting and writhing, faces laughing and crying, men dancing, jugglers throwing up balls, &c.; all of which by the peculiar arrangement above detailed will seem to be in motion. A little ingenuity displayed in the construction and painting of the figures upon the pasteboard disc will afford a great fund of amusement.

SOLAR MICROSCOPE.

MAKE a round hole about three inches in diameter in the window-shutter, into which fix a glass lens of about twelve inches focal distance. To the inside of the hole adapt a tube, having (at a short distance from the lens) a slit capable of receiving one or two very thin plates of glass—these are the object-glasses—having the objects to be viewed affixed with very transparent gum water. Into the first tube another, which must be made to slide, is fitted, having at its anterior extremity a lens of half an inch focal distance. When you wish to exhibit, insert your object glass or glasses in the slit prepared for them, taking care that the objects are in the exact axis of the tube. Darken the room, and have a mirror so placed outside that it may reflect the sun's rays on the glasses in a direction parallel to its axis. You will thus have a solar magic lantern. If you now slide the second tube *in or out* a little beyond the focus, the object will be

represented on a card or piece of white paper, held at a proper distance, as greatly magnified: thus an insect will appear as a large animal, a hair as thick as a walking-stick, and so on.

THE PORTABLE DIORAMA.

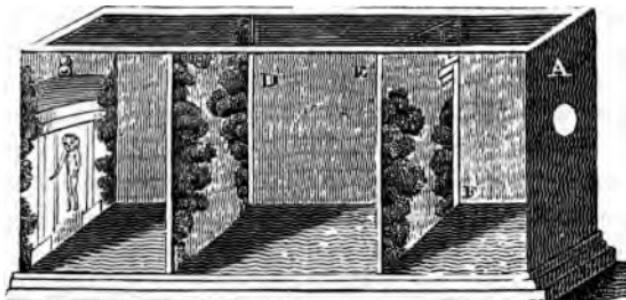
MAKE a neat box to contain any number of transparent views, as landscapes, sea views, ruins of castles, abbeys, &c., which fit into a slight wooden frame. Have some transparencies painted for atmospheric effect, with clouds, a moon, a rainbow, &c., also some plain pieces of silk, of crimson, yellow, or other colours you may think proper. You will also require a gauze curtain.

Now, behind any of the views, place your atmospheric effects, varying them as you choose, and occasionally use the gauze curtain, which must be placed before the views. You will be surprised at the varied effects produced by such simple means. The variations of the atmosphere, aided by the judicious use of your properties, will enable you to produce most pleasing and startling changes, imparting to the views all the changes from early morning to evening, with calms, storms, and fine weather.

THE ARTIFICIAL LANDSCAPE.

PROCURE a box of about a foot long, eight inches wide, and six inches high; or any other dimensions you please; so they do not greatly vary from these proportions. At

each of its opposite ends, on the inside of this box, place a piece of looking-glass that shall exactly fit: but at that end where the sight hole A is, scrape the quicksilver off the glass, through which the eye can view the objects.



Cover the box with gauze, over which place a piece of transparent glass, which is to be well fastened in. Let there be two grooves at each of the places C D E F, to receive two printed scenes as follow:—On two pieces of pasteboard, let there be skilfully painted, on both sides, any subject you think proper, as woods, bowers, gardens, houses, &c., and on two other boards, the same subjects on one side only, and cut out all the white parts: observe also, that there ought to be in one of them some object relative to the subject placed at A, that the mirror placed at B may not reflect the hole on the opposite side.

The boards painted on both sides are to slide in the grooves C D E F, and those painted on one side are to be placed against the opposite mirrors A and B; then cover

the box with its transparent top. This box should be placed in a strong light, to have a good effect.

When it is viewed through the sight hole, it will present an unlimited prospect of rural scenery, gradually losing itself in obscurity; and be found well worth the pains bestowed on its construction.

PHOTOGRAPHY.

PHOTOGRAPHY is so named from the Greek words signifying light, and to write or draw. Scientific men had for many years tried experiments to render the shadows cast by the light of the sun permanent; but it was reserved for M. Daguerre to succeed, by producing, in 1839, sun-pictures on prepared plates of metal (hence called Daguerrotypes), to pave the way for the introduction of Photography as it is now practised.

The following hints will be of use to beginners, and may lead them to avoid some of the errors into which their predecessors have fallen.

The choice of materials and the necessary apparatus demand attention first. The most important item is the lens; and this must be selected with a view to the work it is intended to produce. For portraits, the double Achromatic Lens is the best; and if you intend to produce *cartes-de-visite* from *negatives*, the lens should have a larger aperture than for *positives*.

The next thing will be to procure the camera, or dark

box to which the lens is fixed. This and all other apparatus should be purchased from a respectable well established house. Cheap (or, I should say, low-priced) apparatus and chemicals are seldom of any use to the purchaser. For portraits, the camera is best made of mahogany; ascertain before purchasing that the dark slides perfectly preclude the light getting into them, and let the holders have silver wire corners. The tripod stand for supporting the camera should be strong and steady, especially that for use in the operating-room. Observe that if you have a half or full plate lens, your operating-room should be at least seven yards long.

You will require a dark room wherein to *fix* the pictures after they have left the camera: into this room the light of day should not be allowed to penetrate, except it be through yellow glass; for if the picture just taken were exposed to the daylight, all trace of it would be effaced, since the action of the light would turn the whole surface black.

Other articles requisite will be described as we proceed. Supposing you are desirous of taking pictures on glass, and have procured the necessary apparatus and materials, the first consideration is the place where the portraits are to be taken: if you have command of a gallery or glass house, of course that is the best; if not, it is quite possible to take good pictures in the open air: to do this, you will require a background, with a part projecting over the head of the sitter; but in any case the dark room should be handy for the operator, so that as little time as possible

be occupied between exciting the plate and the exposure, or between taking the plate from the camera until it is fixed. This dark room, as it is termed, should have the window filled with yellow glass, and contain a dipping-bath for the silver solution, some glass dishes, funnels, measures, chamois leathers, glass stirring-rods, circular filter, and a supply of chemicals, with shelves for bottles, hooks for cloths, a sink or slopstone, and an abundant supply of water; indeed, the writer has seen some very good pictures produced in the enclosed yard behind his house, having a rough sheet or shawl on a clothes-horse for a background to the sitter, and using the scullery as a dark room, made so by placing a frame filled with yellow glass before the window, the frame being made to fit exactly the aperture of the window: it is absolutely necessary that no light whatever, but that passing through the yellow glass, be admitted into this room while fixing the picture—the slightest trace of white light would spoil it.

Having your sitter ready, and your camera placed, but not finally arranged, you proceed to coat the glass plate with collodion, which is best kept in a large bottle, from which a smaller one for immediate use should be filled. The glass should be *perfectly clean*, as the smallest speck of dust or grease would entirely spoil the portrait. The young operator should see the whole process performed before attempting it; but it is necessary that the plate be held, horizontally in the left hand by one corner, with the finger and thumb; the collodion should be poured on the

centre of the plate in sufficient quantity to cover the whole of it; this is effected by inclining the plate first to one corner, then to the opposite corner transversely, and then by pouring the surplus off into the bottle at the transverse corner to that by which it is held: care must be taken that the thumb is not touched by the collodion, and after the surplus has been poured off, the glass must be gently tilted from one side to the other, so that no lines may be left on the surface. When the collodion is dry (but not before) the plate must be immersed boldly, and without stopping (as that would form a line across the plate), in a silver bath—which is composed of

| | |
|------------------------------------|-----------|
| Triple Nitrate of Silver | 80 grains |
| Distilled Water | 1 ounce |

A larger quantity than is requisite to fill the bath should be prepared, and the bath should be frequently emptied into the stock bottle. It will take three or four hours to iodize the plate with this mixture; but if you want to use the plate immediately, pour about a dram of collodion to a pint of solution, shake well together and filter, adding a few drops of diluted nitric acid or acetic acid—it is then ready for use. The plate on which the collodion is set is now placed on the dipper, and plunged quickly into the bath; in about a minute draw it out and again immerse it once or twice to allow the ether to evaporate; place it again in the bath for another minute, or until the greasy-looking lines disappear, let it drain on blotting-paper, and

put it in the carrier of the dark slide, prepared side downwards. You now return to the sitter; get the proper focus by so placing the camera as to get the image most distinct on the ground glass (the operator's head being, meanwhile, covered with a piece of black velvet or other black material); you then tighten the screw of the camera, and make the fine adjustment by the rack of the lens. Having succeeded, you take the focussing-glass out of the camera, put the dark slide containing the prepared plate in its place, fix the cap on the front of the lens, and draw up the sliding-door of the dark slide; having the sitter quite still, you remove the cap from the lens, and the figure of the sitter is thrown on the prepared plate; in a few seconds the exposure is complete, you replace the cap on the lens, taking care not to falter or bungle in doing so, put down the sliding-door of the dark slide, and take the slide at once to the dark room for development.

The developing solution is made thus:—

| | |
|-------------------------------------|-----------|
| Protosulphate of Iron | 12 grains |
| Nitrate of Potash | 6 " |
| Glaceal Acetic Acid | 15 minims |
| Alcohol (Spirits of Wine) | 10 " |
| Water | 1 ounce |

Take the plate out of the slide, hold it as when coating it with collodion, pour *along the bottom of the plate* sufficient of the solution to cover it quickly, gently incline the plate so as to allow the solution to flow backwards and forwards. Observe, this solution must be poured *along the bottom of*

the plate, not in one place, or a stain will be the result. When the shaded parts of the portrait begin to appear, pour off the solution, and wash well under a tap. When the plate has been well washed, the yellow window may be opened, as light has no further effect on the picture; it still, however, requires to be fixed. For this you will want a fixing solution made thus:—

| | |
|--------------------------------|---------------------|
| Cyanide of Potassium | 10 grains |
| Nitrate of Silver | $\frac{1}{2}$ grain |
| Distilled Water | 1 ounce |

This may be placed either in a dipping-bath similar to that used for the silver solution, or the plate may be laid in a glass or gutta-percha dish, and the solution poured over it; as soon as the yellow iodide of silver is dissolved, wash the plate well, back and front, and dry it. When dry, pour some transparent varnish on the collodion side, and some dead black varnish on the other side, or place a bit of black or maroon velvet behind it.

These are a few hints intended only for beginners, and therefore other processes are not touched on, as I have not space for fully describing them. Let me now observe that flattened crown glass is suitable for *positive* portraits; that these glasses should be perfectly clean, and free from scratches. Tripoli and spirits of wine mixed to the consistency of cream answers *best for cleaning new glasses*; the mixture to be well rubbed over both sides of the glass, while held in a glass (or plate) holder, then rubbed off with a clean linen cloth, and polished with chamois leather.

Cloths and leathers for cleaning glasses should not be used for any other purpose. There should be no dust in the dark room, or it will adhere to the plates. After the plate is coated with collodion, it should be immersed in the silver bath immediately it is dry, or when the collodion becomes firm. In warm weather it will set very quickly. If the collodion is too thick, a little ether may be added, if dirty it should be filtered through a collodion filter.

The common error of young photographers is to over expose the plate : it is best to begin with a short exposure —say, in fine weather, three seconds, slightly increasing the time for each plate till you find the proper time. If the plate has been over exposed, the developing solution will cause the image to appear the instant it is poured on the plate ; if under exposed, it will take from three to five minutes to develop, and then the portrait will be a failure. In developing, be careful not to let the solution remain on the plate till the darkest shadows are out, or the beauty of the picture will be destroyed. It is recommended that young beginners commence operations by copying some picture or engraving ; they will thus master some of the details without witnesses, and so save themselves the pain of failure in attempting to take a portrait.

E. G. Wood, of Cheapside, keeps all the necessary chemicals, as well as the apparatus for photography, and the writer is satisfied of the excellence of both.

CHAPTER III.

DOMESTIC OR FIRESIDE GAMES.



CHESS.



KNIGHT.



BISHOP.

CHESS, about which so many volumes have been written, stands pre-eminent as a game of skill, with which chance has little or nothing to do.

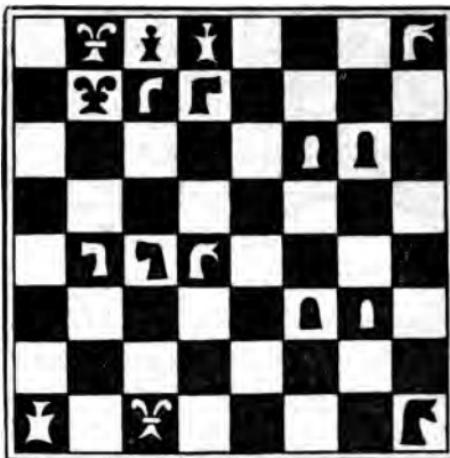
CHESS.





4

The origin of this entrancing game is lost in the obscurity of the dark ages. Some writers ascribe the invention of chess to the natives of India, and assert that it was brought into Europe by the Arabs; however this may be, it is certain it was known and practised by the *ancient* Egyptians, as is evidenced by paintings on the walls of their temples, which represent two persons playing chess; but, it must be confessed, their chessmen are of most primitive form.



ANCIENT CHESS-BOARD.

In the British Museum may be seen several specimens of undoubtedly ancient chessmen, and history abounds with anecdotes of the renowned men who made chess their study, as a relaxation from the more arduous duties of

their several stations. Thus, we read that the grandfather of William the Conqueror was a skilful chess-player.

It is also worthy of note, that the first book printed in England (by Caxton in 1474) was a treatise on the game of chess.



ANCIENT CHESSMEN.

CHESS, AN ALLEGORY.

The *board* may be considered the field of life, chequered with good and evil, on which man is to play his game, and be rewarded according to his deserts.

The *pawns* may be looked upon as representing those feelings which are first excited by circumstances, and form barriers to those stronger passions which I would represent by the superior pieces. Happy is the man who, by care and attention to his pawns, maintains that barrier, behind which he may securely bring his pieces into play. But in the game of life, as in chess, the players are generally

anxious for early distinction ; and, to the imprudence of suffering the passions to escape from their line of defence, most of the difficulties and dangers that immediately beset them may be traced.

The *castle*, moving over the board in direct lines, represents that innate sense of justice pervading every human breast, which, however attacked, when properly maintained, cannot be conquered. Strong in its own might, it forms a bulwark of defence at home, while it controls and punishes at a distance the errors of the adversary.

The *knight*, eccentric in his movements, but regulated by fixed principles of action, portrays that feeling of honour which, deviating from the beaten course, seeks for adventures. He often proves a firm friend in the hour of need ; yet his roving propensity sometimes carries him far from succour, and he falls a victim to his chivalrous nature.

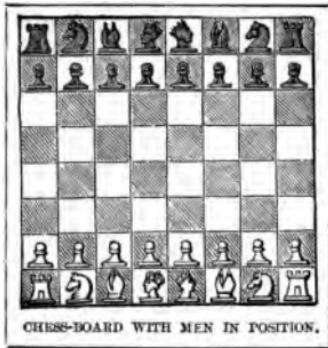
By the walk of the *bishops* may be considered the religious feeling which is continually crossed by the movements of ordinary life : as they never leave the colour of the square they start from, they are typical of a firm faith.

Ambition may find a representative in the *queen*. Combining the power of the castle and bishop, she roams over the field ; like the ambitious of the world, she requires great support from the lower pieces, and is frequently cut off when she ventures too boldly to attack.

The *king*, only moving one square at a time, while every direction is open to his choice, is highly characteristic of prudence. He seldom moves unless forced, shelters himself behind, and claims the succour of justice, honour, reli-

gion, and ambition. The rule which gives the game to the party who deprives the opponent's king of the power of motion, proves that the inventors of the game, unlike the levellers of the present day, were firm loyalists, and duly impressed with the divinity that doth " hedge a king."

The game is played by two persons on a board, or table, similar to that used for draughts, having sixty-four squares, which must be so placed between the players that each shall have a white corner square on the right hand. The rows of squares running from left to right are termed *ranks*, those running from one player to the other are *files*, and those from corner to corner, *diagonals*. The chessmen, or pieces used in playing, are sixteen in number for each player, each set of men being of a different colour. There are eight pawns, two castles or rooks, two knights, two bishops, one queen, and one king. These sixteen pieces are to be placed on the two rows of squares nearest to the players, thus:—



It will be seen that the superior pieces occupy the rank

nearest to the players. The right-hand corner square is for the white rook or castle, the next for a knight, the next for a bishop, the next the king, then the queen, then the other bishop, knight and rook, which fills the eight squares. The pawns are placed in the rank immediately before these, and take the name of the piece before which they are first placed. The king and queen occupying the two squares in the middle of the rank, the pieces adjoining them are named severally the queen's bishop, knight and rook; those adjoining the king are in like manner named the king's bishop, knight and rook; and the pawns, the queen's rook's pawn, queen's knight's pawn, queen's bishop's pawn, queen's pawn, king's pawn, king's bishop's pawn, king's knight's pawn, and king's rook's pawn. The black or red pieces are similarly placed, so that each piece is opposed by one of the same value. The squares are called after the pieces that are placed on them at the commencement of the game, and retain the name after the pieces have been moved; so that we have queen's rook's square, queen's knight's square, and so on for the others. The squares on which the pawns stand are called the second squares of the principal pieces; thus we have queen's second square, king's second square, &c.; the third, fourth, fifth, sixth, seventh, and eighth, are likewise called the third, fourth, fifth, sixth, seventh, and eighth rows of the pieces, the last four rows being those of the opposing player. *Observe*, it is necessary, in naming the pieces and squares, to add the colour of the pieces.



QUEEN.

FLAXMAN'S CHESSMEN.

KING.

VALUE OF THE SEVERAL PIECES, WITH THEIR MOVES.

The *pawn* is of the least value, since it can only attack two points at a time, and but one if it is on the files, at the edge of the board. It is moved one square at a time in a straightforward direction, from which it never deviates unless to take a piece, in which case it moves diagonally, but is limited to the adjoining front row of squares. The pawn cannot be moved backward, and is the only piece with such limited powers. Those on the centre are more valuable than those on the side files; though the former, being more liable to attack, seldom reach the dignity of queen, which is attained on gaining the eighth square. At the first move the pawn may be advanced two squares.

The *knight* is of equal value with the bishop; though one knight is stronger than one bishop in the progress of the game, and may be moved one square diagonally, and one square forward, thus occupying a square of a different colour to that from whence he started. He is the only piece that can play over any piece or pawn. He is more powerful and useful as he approaches the centre of the board.

The *bishop*, at the commencement of a game, is of the same value as a knight, but towards the end two bishops are of more value than two knights, since they can checkmate, which the knights cannot. The king's bishop is of more value than the queen's, for he can check the king on his own square, or after he has castled. The *bishop*

moves diagonally, never leaving the colour on which he is first placed.

The *rook*, or *castle*, ranks in value next below the queen, and is the only piece which retains its full value as it approaches the side of the board. The rook and queen are the only pieces which can give check-mate singly. The rook moves straightforward, backward, or across, and may move over any number of squares to take a piece, provided no other piece interrupts it. It cannot be moved diagonally.

The *queen* is very powerful at the commencement of a game, but, as the power of the other pieces increases towards the termination, her importance is somewhat lessened. The queen may be moved in any direction, either backward, forward, across, or diagonally, and over as many squares as may be unoccupied.

The *king* is the chief, and cannot be captured. He moves only one square at a time, but can move either backward, forward, or diagonally. His power increases towards the termination of a game. The opposing kings can never approach nearer to each other than the distance of a knight's move. In the course of a game he may make a move, which is termed "castling."

RULES FOR CHESS.

1. In each game, the players have the first move alternately, except where one gives the other odds; the party by whom they are given is entitled to the first move.
2. The board must be placed so that each player has the

white square on his right hand ; and the queen is always placed on the square of her own colour at the commencement of the game.

3. If you misplace your men at the beginning, and play four moves, your adversary may permit you to begin the game afresh, or not, as he pleases.

4. If you touch a piece you must play it, unless it would open check on your king ; in which case, you can only move the king, if it be practicable. When you have taken your hand from your man, he must remain where he is ; but as long as you keep hold of him, you are at liberty to place him where you please, though you may have set him down upon a square.

5. If you touch one of your adversary's men, he may insist upon your taking it if you can ; if not, you must move your king, if that be possible, without putting him in check.

6. You must not move in any way to put your own king in check.

7. You cannot castle after moving the rook or king : if you attempt to do so, your adversary may insist on your moving one of those pieces, at his option, and you can only castle once in the game.

8. You cannot castle if your king would thereby come to a square which is in check, or if it would *cross* a square in check ; nor when the king is in check in order to get out of it.

9. If your opponent challenge you with "check," without your king being in check, and you, in consequence,

his last move, and the check be provided for as given.

11. If the king be not in check, but cannot move going into check, and have no piece or pawn left, none that can be moved, he is stale-mated, and the drawn.

12. Check-mate is given when you put the king in and he cannot move out of it nor cover it.

13. If one party has *only his king*, and the other king and a castle, or a king and two bishops, or a bishop, and a knight, the losing player may give his opponent notice that he must check-mate him in fifty moves; if he fail to do so, the game is drawn.

N.B. This does not apply when the winner has a check-mate on a particular square, or with a pawn piece.

14. If you can keep your opponent in *perpetual check*,



EXPLANATION OF TERMS, &c.

CHECK.—The king is in check when he is in such a position that, were he any other piece, he would be taken. But as a king can never be taken, he is said to be *in check*. There are three sorts of checks; a simple check, a double check, and a check by discovery. The first is when the king is attacked by the piece that is moved. The second is when two pieces give check at once; and the third takes place when, from the moving a piece away, a check is opened from another piece.

PERPETUAL CHECK is when one player has the power constantly to keep checking the other, but not so as to give

FOOL'S MATE.

BLACK.

- 1 K. B. P. one square.
- 2 K. Kt. P. two squares.

WHITE.

- 1 K. P. two squares
- 2 Q. to K. R. fifth
check-mating

SCHOLAR'S MATE.

WHITE.

- 1 K. P. two squares.
- 2 K. B. to Q. B. fourth square.
- 3 Q. to K. R. fifth square.
- 4 Q. takes K. B. P. and check-
mates.

BLACK.

- K. P. two squares.
- K. B. to Q. B. fourth
- Q. P. one square.

EN PASSANT.—Taking “en passant” is when, at the first starting, it is played two squares at once, and over a square threatened by a pawn of your adversary has the privilege of taking it, as if it had only m

squares, your opponent may take it as if it had moved only one square, inasmuch as it passes over a square, the white king's third, which is commanded by one of his pawns.

CASTLING THE KING.—Move the king two squares either to the right or left, and bring the castle on the other side of it. The space between the king and the castle with which you perform this must be clear of pieces.

STALE-MATE.—A king is stale-mated when all the men of his colour are either off the board, or so opposed that they cannot move, and himself in such a position that, though not actually in *check*, he cannot move without going into check.

DOUBLE PAWN is a pawn that has passed from his original file to another through taking an opposing piece, and which therefore stands on the same file as another of its own colour.

PASSED PAWN.—A pawn is styled *passed* when there is no opposing piece to hinder its progress to the queenly power.

QUEEN THE PAWN is to demand a queen for a pawn that has reached the eighth line of squares.

DRAWN GAME.—A drawn game occurs—When there are not men enough on the board; when either king is stale-mated; when both players continue making the same moves; when the players are unable to check-mate in fifty moves, though there are enough men on the board; when the opposing king is in perpetual check; and when each player has a small and equal number of powerful pieces.

THE KNIGHT'S LEAPS.

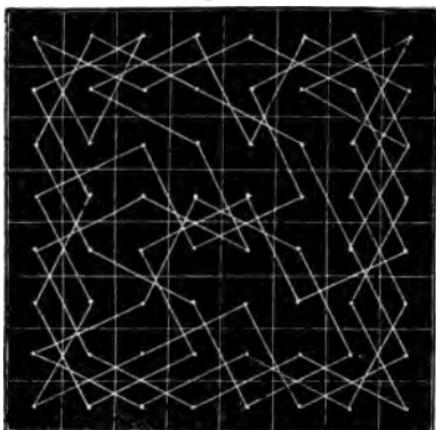
Chess-board numbered, to enable the reader to perform

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|----|----|----|----|----|----|----|----|
| 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 |
| 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 |
| 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 |
| 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 |
| 57 | 58 | 59 | 60 | 6 | 62 | 63 | 64 |

THE KNIGHT'S LEAPS OVER THE CHESS BOARD.

Diagram of the moves.

1

*Order of the moves.*

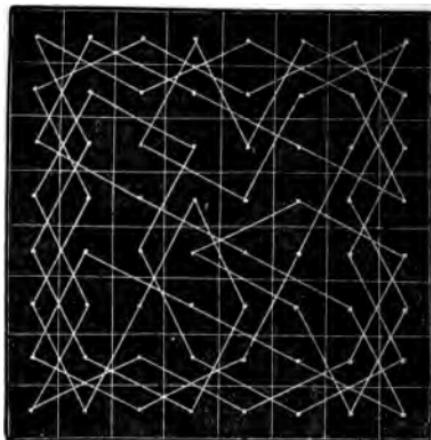
1

| | | | | | | | |
|----|----|----|----|----|----|----|----|
| 50 | 19 | 48 | 1 | 52 | 3 | 34 | 37 |
| 47 | 64 | 51 | 20 | 33 | 36 | 53 | 4 |
| 18 | 49 | 30 | 63 | 2 | 21 | 38 | 35 |
| 29 | 46 | 61 | 12 | 41 | 32 | 5 | 54 |
| 60 | 17 | 42 | 31 | 62 | 13 | 22 | 39 |
| 45 | 28 | 11 | 16 | 25 | 40 | 55 | 6 |
| 10 | 59 | 26 | 43 | 8 | 57 | 14 | 23 |
| 27 | 44 | 9 | 58 | 15 | 24 | 7 | 56 |

Leap 1.—From 4 to 21 to 6 to 16 to 31 to 48 to 63 to 53 to 59 to 49 to 43 to 28 to 38 to 55 to 61 to 44 to 34 to 17 to 2 to 12 to 22 to 39 to 56 to 62 to 45 to 51 to 57 to 42 to 25 to 19 to 36 to 30 to 13 to 7 to 24 to 14 to 8 to 23 to 40 to 46 to 29 to 35 to 52 to 58 to 41 to 26 to 9 to 3 to 18 to 1 to 11 to 5 to 15 to 32 to 47 to 64 to 54 to 60 to 50 to 33 to 27 to 37 to 20 to 10 to 4.

Diagram of the moves.

2

*Order of the moves.*

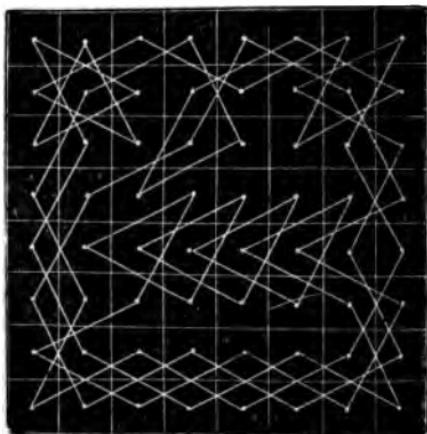
2

| | | | | | | | |
|----|----|----|----|----|----|----|----|
| 41 | 48 | 29 | 2 | 43 | 4 | 27 | 62 |
| 30 | 19 | 42 | 47 | 28 | 63 | 44 | 5 |
| 49 | 40 | 1 | 20 | 3 | 46 | 61 | 26 |
| 18 | 31 | 50 | 35 | 64 | 11 | 6 | 45 |
| 39 | 56 | 21 | 10 | 51 | 60 | 25 | 12 |
| 32 | 17 | 34 | 55 | 36 | 9 | 52 | 7 |
| 57 | 38 | 15 | 22 | 59 | 54 | 13 | 24 |
| 16 | 33 | 58 | 37 | 14 | 23 | 8 | 53 |

Leap 2.—From 19 to 46 to
21 to 6 to 16 to 31 to 49 to
63 to 46 to 36 to 30 to 45 to
55 to 61 to 51 to 57 to 43 to
25 to 10 to 20 to 35 to 52 to
62 to 56 to 39 to 24 to 7 to
13 to 3 to 9 to 26 to 41 to
58 to 43 to 28 to 45 to 60 to
50 to 33 to 18 to 1 to 11 to
5 to 15 to 32 to 22 to 12 to
2 to 17 to 27 to 37 to 47 to
64 to 54 to 44 to 34 to 49 to
59 to 53 to 38 to 23 to 8 to
14 to 29 to 19.

Diagram of the moves.

3



Order of the moves.

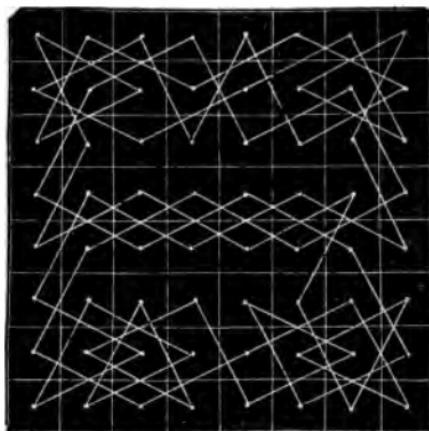
3

| | | | | | | | |
|----|----|----|----|----|----|----|----|
| 1 | 4 | 7 | 16 | 37 | 12 | 9 | 26 |
| 6 | 17 | 2 | 13 | 8 | 27 | 38 | 11 |
| 3 | 64 | 5 | 36 | 15 | 10 | 25 | 28 |
| 18 | 35 | 14 | 47 | 50 | 53 | 56 | 39 |
| 63 | 48 | 51 | 54 | 57 | 40 | 29 | 24 |
| 34 | 19 | 46 | 49 | 52 | 55 | 58 | 41 |
| 45 | 62 | 21 | 32 | 43 | 60 | 23 | 30 |
| 20 | 33 | 44 | 61 | 22 | 31 | 42 | 59 |

Leap 3.—From 1 to 11 to 17 to 2 to 19 to 9 to 8 to 13 to 7 to 22 to 16 to 6 to 12 to 27 to 21 to 4 to 10 to 25 to 42 to 57 to 51 to 61 to 55 to 40 to 23 to 8 to 14 to 24 to 39 to 56 to 62 to 52 to 58 to 41 to 26 to 20 to 5 to 15 to 32 to 38 to 48 to 63 to 53 to 59 to 49 to 43 to 28 to 34 to 44 to 29 to 35 to 45 to 30 to 36 to 46 to 31 to 37 to 47 to 64 to 54 to 60 to 50 to 33 to 18 to 1.

Diagram of the moves.

4

*Order of the moves.*

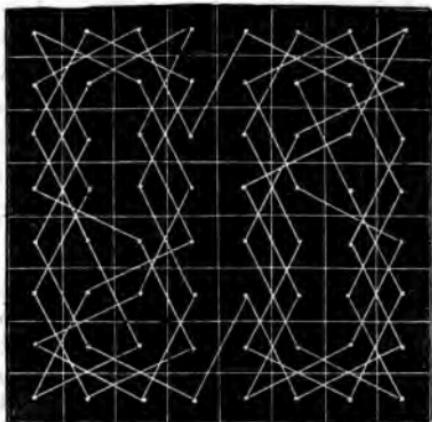
4

| | | | | | | | |
|----|----|----|----|----|----|----|----|
| 12 | 9 | 2 | 33 | 4 | 7 | 62 | 59 |
| 1 | 34 | 11 | 8 | 63 | 60 | 31 | 6 |
| 10 | 13 | 64 | 3 | 32 | 5 | 58 | 61 |
| 35 | 54 | 15 | 28 | 37 | 56 | 17 | 30 |
| 14 | 27 | 36 | 55 | 16 | 29 | 38 | 57 |
| 53 | 50 | 47 | 44 | 41 | 18 | 23 | 20 |
| 26 | 45 | 52 | 49 | 24 | 21 | 42 | 39 |
| 51 | 48 | 25 | 46 | 43 | 40 | 19 | 22 |

Leap 4.—From 9 to 4 to 5 to 20 to 5 to 22 to 16 to 6 to 12 to 2 to 17 to 11 to 1 to 18 to 33 to 27 to 37 to 31 to 46 to 63 to 48 to 54 to 64 to 47 to 53 to 59 to 49 to 34 to 28 to 38 to 32 to 15 to 21 to 4 to 10 to 25 to 35 to 29 to 39 to 56 to 62 to 45 to 55 to 61 to 44 to 50 to 60 to 43 to 58 to 52 to 42 to 57 to 51 to 41 to 26 to 36 to 30 to 40 to 23 to 8 to 14 to 24 to 7 to 13 to 19 to 9.

Diagram of the moves.

5

*Order of the moves.*

5

| | | | | | | | |
|----|----|----|----|----|----|----|----|
| 18 | 9 | 28 | 3 | 24 | 15 | 30 | 5 |
| 27 | 2 | 19 | 16 | 29 | 4 | 23 | 14 |
| 10 | 17 | 8 | 25 | 12 | 21 | 6 | 31 |
| 1 | 26 | 11 | 20 | 7 | 32 | 13 | 22 |
| 54 | 45 | 64 | 39 | 52 | 43 | 58 | 33 |
| 63 | 38 | 53 | 44 | 57 | 40 | 49 | 42 |
| 46 | 55 | 36 | 61 | 48 | 51 | 34 | 59 |
| 37 | 62 | 47 | 56 | 35 | 60 | 41 | 50 |

Leap 5.—From 25 to 10
to 4 to 14 to 8 to 23 to 29 to
19 to 2 to 17 to 27 to 21 to
31 to 16 to 6 to 12 to 18 to
1 to 11 to 28 to 22 to 32 to
15 to 5 to 20 to 26 to 9 to 8
to 13 to 7 to 24 to 30 to 40
to 55 to 61 to 51 to 57 to 42
to 36 to 46 to 63 to 48 to 38
to 44 to 34 to 49 to 59 to 53
to 47 to 64 to 54 to 37 to 43
to 33 to 50 to 60 to 45 to 39
to 56 to 62 to 52 to 58 to 41
to 35 to 25.

The leaps may be commenced on any given square

ANECDOTES.

Al Amin, khalif of Bhagdat, was earnestly employed at this game when his capital residence was on the point of being taken by assault. Tamerlane the Great is recorded to have been engaged at chess during the decisive battle between him and Bajazet. King John of England insisted upon concluding his game before he gave an audience to the deputies from Rouen, coming to apprise him that their city was besieged.

King James I. styled this game a philosophic folly. His son, Charles I., was at chess when told that the Scots had finally determined upon selling him to the English; and he did not seem in any way discomposed, but coolly continued his game. Charles XII. of Sweden, when surrounded, in a house of Bender, by the Turks, barricaded the premises, and then coolly sat down to chess. This prince always used the king more than any other piece, and thereby lost every game; not perceiving that the king, although the most considerable of all those on the board, is useless when left to himself.

DRAUGHTS.

DRAUGHTS is played by two persons sitting opposite each other with the board (which exactly resembles a chess-board) between them. You will note that there are sixty-four squares on the board, of which thirty-two are white and thirty-two black. The game is played on the white squares, and the board must be placed so that the two white squares (upper and lower) at the corner are on the left hand of each player. The men are black and white, twenty-four in number; twelve being black and twelve white: these men are placed singly on the twelve white squares nearest to each player. The men can only be moved diagonally or slantingly from one white square to another in a forward direction. Each player moves one of his men alternately, and as the object is either to capture your adversary's men or to blockade those he has left on the board in such a manner that he cannot move his men without their being captured, it will be at once seen that playing this game requires some exertion of thought and the power of combination.

The men take their adversaries in the direction in which they move diagonally to the right or left, by leaping over any man that has a blank square behind it, and if, through want of care in bringing the men forward, there be more than one so placed that has a blank space behind it, the captor may leap over such men in succession and remove them from the board.

It is of much importance to get your men crowned as soon as possible ; this is effected by forcing them through your adversary's men till they reach one of the row of white squares nearest to him ; he then must place another of your men on the top of the one so placed, and the crowned man becomes a *king*, and can then move backwards or forwards, but always diagonally : the king, however, can at any time be taken by a man, should he be placed in the proper position for capture ; that is, with a blank square on the side diagonally opposite to that on which the adversary's man is placed, and in the way he is going. No advantage is derived from being first player ; for the men and squares being both even, he cannot have the move ; and though the opponent has it, it is of no use to him in that position of the game.

RULES FOR DRAUGHTS.

1. Each player takes the first move alternately, whether the last game be won or drawn.
2. Any action which prevents either player from having a full view of the men is not allowed.
3. The player who touches a man must play him.
4. If a player omits to take a man when an opportunity for so doing occurs, the other player may either take the man, or insist upon his man (which has been so omitted by his adversary) being taken.
5. Persons not playing are not to advise, or in any manner interfere with the game.

6. If there be three kings to two on the board, or two to one, the subsequent moves are not to exceed forty, or the game is drawn, but due notice must be given to the stronger side before the counting begins.

7. The game is won when one player has captured or blockaded the men belonging to his antagonist, in such a manner that he has either no piece left to play with, or no space in which to move those men he has.

8. In playing the losing game either player may insist on his opponent taking all the men he has to lose.

DOMINOES.

THE box contains twenty-eight oblong pieces, with plain backs, and having the faces of each divided into two parts by a line across the middle, each division being either blank, or marked with round black spots which designate a number. These are double blank, blank and 1, blank and 2, &c., up to blank and 6; then 1 and 1, 1 and 2, 1 and 3, up to 1 and 6, and so on. This game is best played by two persons, although more can join in it. The dominoes are placed face downward on the table, mixed up and distributed, an equal number to each player. Each then places his pieces so that his adversary cannot see the spots. The game begins by the player who has the double-6 putting it out and following it up by a domino with the number 6 at one side. Suppose it contains the numbers 6

and 3 ; then the opposite player looks in his collection for a piece that has on it either of these numbers. If it has 6, he plays it on the other side the double-6, all double number being laid across ; if 3, he places the end with the 3 against the other 3 already laid down. If he has double-3, he can play that and one to follow. The next player now has to find a domino that has a similar number to one of the two extremes, and so on. A double may always have one to follow it with the same number on. If one of the players cannot match either end, he says "go," and loses his turn. The winner of the game is the one who has first played out all his dominoes ; or if neither play out, he who has the fewest spots remaining. The box often contains forty-five pieces, up to double-9. The game of play and draw is sometimes adopted, where each player takes a limited number of pieces, and, if he cannot "go," must draw from the stock until he finds a suitable piece. In either game the player who has the greatest number of spots, when neither can go, loses.

PROVERBS.



LET one person leave the room. Those who remain within select a well-known proverb, and then recall the banished one. He then asks them round any questions he likes, and in their answers, the company have each to bring in one word of the proverb in its right order. For instance, "A bird in hand is worth two in the bush." A has to bring in *a*, B *bird*, C *in*, D *hand*, and so on. The questioner is then allowed five minutes to guess.

CROSS QUESTIONS AND CROOKED ANSWERS

Is a well-known game, and is good fun if managed well.

WHAT'S IT LIKE.—Let one leave the room. Those within select an object, and tell him on his return whether the

object is animal, vegetable, or mineral. He asks each, "What's it like?" or "Where is it found?" From the answers he tries to guess what it is. Thus:—Take a *thrush*. What is it? Animal. Where is it found? In the hedges. What's it like? A, a thief. Again, What's it like? B, an army. Again, C, a convict. And so on to each in the room. If it can be now guessed, well and good; if not, the questioner asks each one, Why is it like it? A, because in the evening he steals notes (the thrush at night imitates the nightingale); B, because it has a body and wings; C, because it's often caged.

CHARADES.

AMONG modern resources for spending an evening the charade is a great favourite.

It may be performed with or without scenery. Its dramatic effect is of course greatly heightened by such an appendage, which, with a little skill in the application of water and body-colours, may be accomplished at small cost, by the use of slight wood frame-work and rough cartridge paper, which may easily be made to represent cottages or avenues of trees.

The gist of the charade consists in the dramatic representation of a selected word, in its various syllables, and then in the whole; the audience being required at the close of the whole performance to say what the word is.

The dramatis personæ must be arranged long enough

beforehand to be master of the parts assigned to each, the acting being more or less complicated, as time and other facilities admit.

As separate syllables have rarely any meaning, they must be represented by anything which their sound may suggest, without regard to orthography, and often by the adroit use of puns. But it is not well to take so much liberty with the sound as to represent such a syllable as *a* by the scene of a *hay*-field, though this is sometimes done. Let us take the word *pianoforte* as an illustration of a charade.

The scene opens with a conversation between a lady and gentlemen, one of them displaying a fine pea-flower (artificial if necessary). Attention is drawn to this, and the word *pea* introduced. This may be succeeded by the rushing in of a schoolboy, with a pea-shooter, which is discharged into the face of one of the party, giving occasion for the repetition of the word. When this first syllable has been thought to be sufficiently illustrated without making the clue too plain, the curtain drops, and the next scene presents a conversation in which some half-taught genius is trying to mend the spelling of another:—
“ Angelina, I am ashamed of you; spelling your note to a gentleman in such a fashion as that; you spell ‘ *hofficer* ’ with a *h*; it should always begin with *an o*; ” and so this converse may be prolonged to any extent that the ingenuity of the parties may enable them to vary it. The scene changes, and a knock at the door announces an invitation to a tea-

party. A company sits down to the table with all the apparatus provided. Any of the varied accompaniments, such as cress, cake, eggs, &c., or the arrival of a friend just in time "*for tea*," will suggest the conclusion of the word. And a spirited finale on the instrument itself would be a happy illustration of the whole word. It is easy to see what scope is afforded in this pastime for varieties in dress and performance, in which comic, tragic, or farcical may find its fitting place.

ARITHMETICAL PASTIMES.

CURIOS PROPERTIES OF SOME FIGURES.

SELECT any two numbers you please, and you will find that one of the two, their amount when added together, or their difference, is always 3, or a number divisible by 3.

Thus if the numbers are 3 and 8, the first number is 3 let the numbers be 1 and 2, their sum is 3; let them be and 7, the difference is 3. Again, 15 and 22, the fir number is divisible by 3; 17 and 26, their difference divisible by 3, &c.

All the odd numbers above 3, that can only be divid by 1, can be divided by 6, and by the addition or s traction of a unit. For instance, 13 can only be divi by 1; but after deducting 1, the remainder can only divided by 6; for example, $5+1=6$; $7-1=6$; $17+1=19-1=18$; $25-1=24$, and so on.

If you multiply 5 by itself, and the quotient agai

itself, and the second quotient by itself, the last figure of each quotient will always be 5. Thus $5 \times 5 = 25$; $25 \times 25 = 125$; $125 \times 125 = 625$; &c. Again, if you proceed in the same manner with the figure 6, the last figure will constantly be 6; thus, $6 \times 6 = 36$; $36 \times 36 = 216$; $216 \times 216 = 1,296$, and so on.

To multiply by 2 is the same as to multiply by 10 and divide by 5.

Any number of figures you may wish to multiply by 5, will give the same result if divided by 2—a much quicker operation than the former; but you must remember to annex a cipher to the answer where there is no remainder, and where there is a remainder, annex a 5 to the answer. Thus, multiply 464 by 5, the answer will be 2320; divide the same number by 2, and you have 232, and as there is no remainder you add a cipher. Now, take 357, and multiply by 5—the answer is 1785. On dividing 357 by 2, there is 178, and a remainder; you therefore place 5 at the right of the line, and the result is again 1785.

There is something more curious in the properties of the number 9. Any number multiplied by 9 produces a sum of figures which, added together, continually makes 9. For example, all the first multiples of 9, as 18, 27, 36, 45, 54, 63, 72, 81, sum up 9 each. Each of them multiplied by any number whatever produces a similar result; as 8 times 81 are 648, these added together make 18, 1 and 8 are 9. Multiply 648 by itself, the product is 419,904—the sum of these digits is 27, 2 and 7 are 9. This rule is invariable. Take any number whatever and multiply it

by 9 ; or any multiple of 9, and the sum will consist of figures which, added together, continually number 9. $17 \times 18 = 306$, 6 and 3 are 9 ; $117 \times 27 = 3,159$, the figures sum up 18, 8 and 1 are 9 ; $4591 \times 72 = 330,552$, the figures sum up 18, 8 and 1 are 9. Again, $87,363 \times 54 = 4,717$, added together the product is 27, or 2 and 7 are 9, and so always. If any row of two or more figures be repeated and subtracted from itself, the figures composing the remainder will, when added horizontally, be a multiple of nine :—

$$\begin{array}{r} 42 \\ 24 \\ \hline 18 - 9 \times 2 \end{array} \qquad \begin{array}{r} 886 \\ 688 \\ \hline 198 - 9 \times 2 \end{array} \qquad \begin{array}{r} 3261 \\ 1623 \\ \hline 1638 - 9 \times 2 \end{array}$$

If a multiplicand be formed of the digits in their required order, omitting the 8, a multiplier may be found by a rule which will give a product, each figure of which shall be the same. Thus if 12345.679 be given, and it be required to find a multiplier which shall give the product all the same figures, that multiplier will be 18 : if in 3, the multiplier will be 27 : if all 4, it will be 36—and so forth.

$$\begin{array}{r} 12345679 \\ 18 \\ \hline 98765432 \\ 12345679 \\ \hline 222222222 \end{array} \qquad \begin{array}{r} 12345679 \\ 27 \\ \hline 86419753 \\ 24691358 \\ \hline 333333333 \end{array} \qquad \begin{array}{r} 12345679 \\ 36 \\ \hline 74074074 \\ 37037037 \\ \hline 444444444 \end{array}$$

The rule by which the multiplier is discovered (which we do not attempt to explain) is this : Multiply the last figure (the 9) of the multiplicand by the figure

you wish the product to be composed, and the product of such multiplication will be the required multiplier. Thus, when it was required to have the product composed of 2, the 2 multiplied by 9 gives 18, the multiplier : 3 multiplied by 9 gives 27, the multiplier to give the product in 3, &c.

If a figure, with a number of ciphers attached to it, be divided by 9, the quotient will be composed of one figure only, namely, the first figure of the dividend, as—

$$\begin{array}{r} 9)600,000 \\ \hline 66,666-6 \end{array}$$

$$\begin{array}{r} 9)40,000 \\ \hline 4,444-4 \end{array}$$

If any sum of figures can be divided by 9, as $\left\{ \begin{array}{r} 9)549 \\ \hline 61 \end{array} \right.$

the amount of these figures, when added together, can be divided by 9:—thus, 5, 4, 9, added together make 18, which is divisible by 9. If the sum 549 is multiplied by any figure, the product can also be divided by 9, as—

$$\left. \begin{array}{r} 549 \\ \hline 9)3294 \\ \hline 336 \end{array} \right\} \text{And the amount of the figures of the product can also be divided by 9, thus, } \left\{ \begin{array}{r} 3 \\ 2 \\ 9 \\ 4 \\ \hline 2)18 \\ \hline 9 \end{array} \right.$$

To multiply 9, add a cipher, and deduct the sum that is to be multiplied: thus,

$$\left. \begin{array}{r} 43,260 \\ 4,326 \\ \hline 38,934 \end{array} \right\} \text{Produces the same result as } \left\{ \begin{array}{r} 4,326 \\ 9 \\ \hline 38,934 \end{array} \right.$$

In the same manner, to multiply by 99, add two ciphers

by 999, three ciphers, &c. These properties of the figure 9 enable the young arithmetician to perform an amusing trick quite sufficient to excite the wonder of the uninitiated.

Any series of numbers that can be divided by 9, as 472, 821, 754, &c., being shown, a person may be questioned to multiply secretly either of these series by figures he pleases, to strike out one number of the quotient, and to let you know the figures which remain in any order he likes; you will then, by the assistance of knowledge of the

| | | |
|--------|---------------------------------------|----|
| | above properties of 9, easily de- | 2 |
| | clare the numbers which have been | |
| 365472 | erased. Thus, suppose 365,472 | 9 |
| 6 | are the numbers chosen, and the | |
| — | multiplier is 6; if then, 8 is struck | 2 |
| 219232 | out, the numbers returned to you | |
| | will be | 3 |
| | | |
| | | 2 |
| | | |
| | | — |
| | | 19 |

The amount of these numbers is 19: but 19, divided by 9, leaves a remainder of 1; you, therefore, want 8 to complete another 9: 8, then, is the number erased.

The component figures of the product made by the multiplication of every digit into the number 9, when added together, make NINE.

The order of these component figures is reversed: the said number has been multiplied by 5.

The component figures of the amount of the multiplication (viz. 45) when added together, make NINE.

The amount by the several products, or multiples (viz. 405), when divided by 9, gives for a quotient, that is, $4+5=NINE$.

The amount of the first product (viz. 9) when added to the other product, whose respective component figures make 9, is 81; which is the square of NINE.

The said number 81, when added to the above-mentioned amount of the several products, or multiples of 9 (viz. 405), makes 406, which, if divided by 9, gives for a quotient 54: that is, a $5+4 = \text{NINE}$.

It is also observable, that the number of changes that may be rung on nine bells is 362,880; which figures, added together, make 27: that is, $2+7 = \text{NINE}$.

And the quotient of 362,880, divided by 9, will be 40,320; that is, $4+0+3+2+0 = \text{NINE}$.

If number 37 be multiplied by any of the progressive numbers arising from the multiplication of 3 with any of the units, the figures in the quotient will be similar, and the result may be known beforehand by merely inspecting the progressive numbers; thus, 3, 6, 9, 12, 15, 18, 21, 24, 27, &c., are the progressive numbers formed by 3 multiplied by the units 1 to 9; and the result of the multiplication of any of these numbers with 37 may be seen in the following examples: — $37 \times 3 = 111$; $37 \times 6 = 222$; $37 \times 12 = 444$; $37 \times 24 = 888$: by which it appears that the numbers of which the quotient is formed are the same as the units by which the number 3 was multiplied to obtain the respective progressive numbers. Thus—3 multiplied by 2 is equal to 6, and 37 multiplied by 9 is equal to 222; so, again, 4 multiplied by 3 produces 12, and 37 multiplied by 12 is equal to 444, and so on.

THE MATHEMATICAL FORTUNE-TELLER.

Procure six cards, and having ruled them the same following diagrams, write in the figures neatly and large.

It is required to tell the number thought of by any person, the numbers being contained in the cards, and the numbers not to exceed 60. How is this done?

| | | | | | |
|----|----|----|----|----|----|
| 3 | 5 | 7 | 9 | 11 | 1 |
| 13 | 15 | 17 | 19 | 21 | 23 |
| 25 | 27 | 29 | 31 | 33 | 35 |
| 37 | 39 | 41 | 43 | 45 | 47 |
| 49 | 51 | 53 | 55 | 57 | 59 |

| | | | | |
|----|----|----|----|---|
| 5 | 6 | 7 | 13 | 1 |
| 14 | 15 | 20 | 21 | 2 |
| 28 | 29 | 30 | 31 | 3 |
| 52 | 38 | 39 | 44 | 4 |
| 47 | 53 | 54 | 55 | 6 |

| | | | | | |
|----|----|----|----|----|----|
| 9 | 10 | 11 | 12 | 13 | 8 |
| 14 | 15 | 24 | 25 | 26 | 27 |
| 28 | 29 | 30 | 31 | 40 | 41 |
| 42 | 43 | 44 | 45 | 46 | 47 |
| 56 | 57 | 58 | 59 | 60 | 13 |

| | | | | |
|----|----|----|----|---|
| 3 | 6 | 7 | 10 | 1 |
| 14 | 15 | 18 | 19 | 2 |
| 26 | 27 | 30 | 31 | 3 |
| 38 | 39 | 42 | 43 | 4 |
| 50 | 51 | 54 | 55 | 5 |

| | | | | | |
|----|----|----|----|----|----|
| 17 | 18 | 19 | 20 | 21 | 16 |
| 22 | 23 | 24 | 25 | 26 | 27 |
| 28 | 29 | 30 | 31 | 48 | 49 |
| 50 | 51 | 52 | 53 | 54 | 55 |
| 56 | 57 | 58 | 59 | 30 | 60 |

| | | | | |
|----|----|----|----|---|
| 33 | 34 | 35 | 36 | 3 |
| 38 | 39 | 40 | 41 | 4 |
| 44 | 45 | 46 | 47 | 4 |
| 50 | 51 | 52 | 53 | 5 |
| 56 | 57 | 58 | 59 | 6 |

Request the person to give you the cards containing the number, and then add the right-hand upper corner figures together, which will give the correct answer. For example: suppose 10 is the number thought of, the cards with 2 and 8 in the corner will be given, which makes the answer 10, and so on with the others.

THE DICE GUESSED UNSEEN.

A pair of dice being thrown, to find the number of points on each dice without seeing them. Tell the person who cast the dice to double the number of points upon one of them, and add 5 to it; then to multiply the sum produced by 5, and to add to the product the number of points upon the other die. This being done, desire him to tell you the amount, and, having thrown out 25, the remainder will be a number consisting of two figures, the first of which, to the left, is the number of points on the first die, and the second figure, to the right, the number on the other. Thus :

Suppose the number of points of the first die which comes up to be 2, and that of the other 3; then, if to 4, the double of the points of the first, there be added 5, and the sum produced 9, be multiplied by 5, the product will be 45; to which, if 3, the number of points on the other die, be added, 48 will be produced, from which, if 25 be subtracted, 23 will remain; the first figure of which is 2, the number of points on the first die, and the second figure 3, the number on the other.

MAGICAL CENTURY.

If the number 11 be multiplied by any one of the nine digits, the two figures of the product will always be alike as appears in the following example :—

| | | | | | | | | |
|----|----|----|----|----|----|----|----|----|
| 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| — | — | — | — | — | — | — | — | — |
| 11 | 22 | 33 | 44 | 55 | 66 | 77 | 88 | 99 |

Now, if another person and yourself have fifty couns a-piece, and agree never to stake more than 10 at a time, you may tell him that if he permit you to stake first you will always complete the even century before him.

In order to succeed, you must first stake 1, and remembering the order of the above series, constantly add what he stakes as many as will make one more than the numbers 11, 23, 33, &c., of which it is composed, you come to 89, after which your opponent cannot possibly reach the even century himself, or prevent you from reaching it.

If your opponent has no knowledge of numbers, may stake any other number first, under 10, provided subsequently take care to secure one of the last terms 67, 78, &c.; or you may even let him stake first, if you take care afterwards to secure one of these numbers.

This exercise may be performed with other numbers, but, in order to succeed, you must divide the number attained by a number which is a unit greater than v, you can stake each time, and the remainder will ther-

the number you must first stake. Suppose, for example, the number to be obtained be 52 (making use of a pack of cards instead of counters), and that you are never to add more than 6; then dividing 52 by 7, the remainder, which is 3, will be the number which you must first stake; and whatever your opponent stakes, you must add as much to it as will make it equal to 7, the number by which you divided, and so in continuation.

THE UNITED DIGITS.

Arrange the figures 1 to 9 in such order that, by adding them together they amount to 100.

$$\begin{array}{r}
 15 \\
 36 \\
 47 \\
 \hline
 98 \\
 2 \\
 \hline
 100
 \end{array}$$

THE REMAINDER.

A very pleasing way to arrive at an arithmetical sum, without the use of either slate or pencil, is to ask a person to think of a figure, then to double it, then add a certain figure to it, now halve the whole sum, and finally to subtract from that the figure first thought of. You are then to tell the thinker what is the remainder.

The key to this lock of figures is, that HALF of whatever sum you request to be added during the working of the

sum IS THE REMAINDER. In the example given, five half of ten, the number requested to be added. amount may be added, but the operation is simplified giving only even numbers, as they will divide without fractions.

EXAMPLE.

| | | | | | | | | | | | | | |
|--------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|----------------------|
| Think of | . | . | . | . | . | . | . | . | . | . | . | . | 7 |
| Double it | . | . | . | . | . | . | . | . | . | . | . | . | 14 |
| Add 10 to it | . | . | . | . | . | . | . | . | . | . | . | . | 10 |
| Halve it | . | . | . | . | . | . | . | . | . | . | . | . | <u>2</u> , <u>24</u> |
| Which will leave | . | . | . | . | . | . | . | . | . | . | . | . | 12 |
| Subtract the number thought of | . | . | . | . | . | . | . | . | . | . | . | . | <u>7</u> |
| The remainder will be | . | . | . | . | . | . | . | . | . | . | . | . | 5 |

TO TELL BY A WATCH DIAL THE HOUR WHEN A PERSON INTENDS TO RISE.

The person is told to set the hand of his watch a hour he pleases, which hour he tells you, and you a your mind 12 to it. You then desire him to count privately the number of that addition on the dial, commencing at the next hour to that at which he intends to rise, and including the hour at which he has placed the hand : he tells you what number this comes to, which will be 2 in advance of the hour.

A intends to rise at 6 (this he keeps to himself) places the hand at 8, or any other, which he tells B, in his own mind, adds 12 to 8, which make 20. B

tells A to count 20 on the dial, beginning at the next hour to that at which he proposes to rise, which will be 7 ; and counting backwards, reckoning each hour as 1, and including in his addition the number of the hour the hand is placed at, the addition will end at 8, thus :—

| | |
|---|-----------|
| The hour the hand is placed at is | 8 |
| The next hour to that which A intends to rise at is 7, which counts for | 1 |
| Count back the hours from 7, and reckon them at 1 each, there will be 11 hours, viz. :—6, 5, 4, 3, 2, 1, 12, 11, 10, 9, 8 . | <u>11</u> |
| Making | <u>20</u> |

The answer is 6.

A PERSON HAVING AN EVEN NUMBER OF SHILLINGS IN ONE HAND, AND AN ODD NUMBER IN THE OTHER, TO TELL IN WHICH HAND THE ODD OR EVEN NUMBER IS.

You desire the person to multiply the number in his right hand by an odd figure, and the number in his left by an even one, and to tell you if the products, added together, be odd or even. If even, the even number is in the right hand ; if odd, the even number is in the left. For instance—

| | | |
|--|--------------------------------|-----------|
| I. Number in the right hand | In the left hand odd | 7 |
| is even | Multiply by | 2 |
| Multiply by | <u> </u> | |
| Product | Product | <u>14</u> |
| Add the product of the left hand | | |
| Which produces a total of 68 . | | |

| | | | | |
|--|----|---------------------------------|---|---|
| II. Number in the right hand is odd | 7 | In the left hand even | . | : |
| Multiply by | 3 | Multiply by | . | - |
| | — | | | |
| Product | 21 | Product | . | : |
| Add the product of the left hand | 36 | | | - |
| | — | | | |
| Which produces a total of 57 | | | | |

To TELL A PERSON ANY NUMBER HE MAY PRIVATELY FIX

When the person has fixed on a number, bid him dot it and add four to that doubling; then multiply the w^l by 5; to the product let him add 12, and multiply amount by 10. From the total of all this, let him ded 320, and tell you the remainder; from which, if you cu the two last figures, the number that remains will be w he fixed on. For instance—

| | |
|--|------|
| Suppose the number chosen is | 7 |
| Which doubled is | 14 |
| Add 4 to it, and it will make | 18 |
| Multiply 18 by 5, which gives | 90 |
| To which add 12, making | 102 |
| Multiply that by 10, making | 1020 |
| From which deducting 320, the remainder is | 700 |
| And by striking off the two ciphers, it becomes the number thought on | 7 |

FIND THE NUMBER OF CHANGES THAT MAY BE RUNG ON
TWELVE BELLS.

Multiply the numbers from 1 to 12 continually into each other, as follow, and the last product will give the number required:—

$$\begin{array}{r} 1 \\ 2 \\ \hline 2 \\ 3 \\ \hline 6 \\ 4 \\ \hline 24 \\ 5 \\ \hline 120 \\ 6 \\ \hline 720 \\ 7 \\ \hline 5,040 \\ 8 \\ \hline 40,320 \\ 9 \\ \hline 362,880 \\ 10 \\ \hline 3,628,800 \\ 11 \\ \hline 39,916,800 \\ 12 \\ \hline 479,001,600 \end{array}$$

or the twenty-four letters will be found to be
62,044,840,173,323,943,936,000.

Now the inches in a square yard being 1,296, th multiplied by 100 gives 129,600, which is the letters each square yard will contain; therefore divide the above row of figures (the number of c 129,600, the quotient, which is

478,741,020,720,095,160,

will be the number of yards. But as all the 24 contained in every permutation, it will require times as large, viz.:

11,849,785,210,282,211,840.

And, as the surface of the whole globe onl 617,197,435,008,000 square yards, it would req face 18,620 times as large as the earth to contair

To TELL ANY NUMBER A PERSON HAS FIXED ON WITHOUT
ASKING HIM ANY QUESTIONS.

You tell the person to choose any number from 1 to 15; he is to add 21 to that number, and triple the amount. Then,

1. He is to take the half of that triple, and triple that half.
2. To take the half of the last triple, and triple that half.
3. To take the half of the last triple.
4. To take the half of that half.

Thus, it will be seen there are four cases where the half is to be taken: the three first are denoted by one of the eight following Latin words, each word being composed of three syllables, and those that contain the letter I, refer to those cases where the half cannot be taken without a fraction; therefore, in those cases, the person who makes the deduction is to add 1 to the number divided. The fourth case shows which of the two numbers annexed to every word has been chosen; for, if the fourth half can be taken without adding 1, the number chosen is in the first column; but if not, it is in the second column.

| <i>The words.</i> | <i>The numbers they denote.</i> | | | | | |
|-------------------|---------------------------------|---|---|---|---|-----------|
| Mi-se-ris | . | . | . | . | . | 8 0 |
| Ob-tin-git | . | . | . | . | . | 1 9 |
| Ni-mi-um | . | . | . | . | . | 2 19 |
| No-ta-ri | . | . | . | . | . | 3 11 |
| In-fer-nos | . | . | . | . | . | 4 12 |
| Or-di-nes | . | . | . | . | . | 13 5 |
| Ti-nui-di | . | . | . | . | . | 6 14 |
| Te-ne-ant | . | . | . | . | . | 15 7 |
| | | | | | | 2 a |

For example:—

| | |
|---|----|
| Suppose the number chosen is | 9 |
| To which is to be added | 1 |
| | 10 |
| The triple of that number is | 30 |
| The half of which is | 15 |
| The triple of that half must be | 45 |
| And the half of that* | 23 |
| The triple of that half | 69 |
| The half of that* | 35 |
| And the half of that half* | 18 |

While the person is performing the operation, you remember that at the second and third stages he is obliged to add 1, and, consequently, that the word *ob-tin-git*, in the second and third syllable of which is an *i*, denotes that the number must be either 1 or 9; and, by observing that he can take the last half without adding 1, you know that it must be the number in the second column. If he makes no additions at any one of the four stages, the number he chose must be 15, as that is the only number that has not a fraction in either of the divisions.

* At all these stages 1 must be added, to take the half without a fraction.

A PERSON HAVING PUT A RING ON ONE OF HIS FINGERS, TO
NAME THE PERSON, THE HAND, THE FINGER, AND THE JOINT,
ON WHICH IT IS PLACED.

Let a third person double the number of the order in which he stands who has the ring, and add 5 to that number ; then multiply that sum by 5, and to the product add 10. Let him next add 1 to the last number, if the ring be on the right hand, and 2 if on the left, and multiply the whole by 10 : to the product of this he must add the number of the finger (counting the thumb as the first finger), and multiply the whole again by 10. Let him then add the number of the joint, and, lastly, to the whole join 35.

He is then to tell you the amount of the whole, from which you are to subtract 3535, and the remainder will consist of four figures : the first of which will express the rank in which the person stands, the second the hand (number 1 signifying the right, and 2 the left), the third number the finger, and the fourth the joint. For example :

Suppose the person who stands the third in order has put the ring upon the second joint of the thumb of his left hand ; then,

| | |
|---|----------|
| The double of the rank of the third person is | 6 |
| To which add | <u>5</u> |
| | 11 |
| Multiply the sum by | <u>5</u> |

| | | |
|--|---------------------------|------|
| | Brought forward | 55 |
| To which add | | 10 |
| And the number of the left hand : | | 2 |
| | | — |
| | | 67 |
| Which being multiplied by | | 10 |
| | | — |
| | | 670 |
| To which add the number of the thumb | | 1 |
| | | — |
| | | 671 |
| And multiply again by | | 10 |
| | | — |
| | | 6710 |
| Then add the number of the joint | | 2 |
| And lastly, the number | | 35 |
| | | — |
| | | 6747 |
| From which deducting | | 3535 |
| | | — |
| The remainder is | | 3212 |
| | | — |

Of which, as we have said, the 3 denotes the third person, the 2 the left hand, the 1 the thumb, and the last 2 the second joint.

To FIND THE DIFFERENCE BETWEEN TWO NUMBERS, THE
GREATEST OF WHICH IS UNKNOWN.

Take as many nines as there are figures in the smallest number, and subtract that sum from the number of nines. Let another person add that difference to the largest number, and taking away the first figure of the amount, add it to the last figure, and that sum will be the difference of the two numbers.

For example, Robert, who is 22, tells George, who is older, that he can discover the difference of their ages; he therefore privately deducts 22 from 99, and the difference, which is 77, he tells George to add to his age, and to take away the first figure from the amount, and add it to the last figure, and that last sum will be the difference of their ages. Thus, the difference between

| | |
|--|------------|
| Robert's age and 99, is | 77 |
| To which George adding his age | 35 |
| The sum will be | <u>112</u> |
| | 12 |
| | 1 |

| | |
|--|-----------|
| Then by taking away the first figure, 1, and adding it to the last figure, 2, the sum is | 13 |
| Which added to Robert's age | 22 |
| Gives George's age, which is | <u>35</u> |

ARITHMETICAL SQUARES.

An arithmetical magical square consists of numbers disposed in parallel and equal lines that the sum of each taken any way of the square, amounts to the same.

A Natural Square.

| A | G | B | | | | |
|----|----|----|----|----|----|---|
| 1 | 2 | 3 | | | | |
| 6 | 7 | 8 | | | | |
| E | 11 | 12 | 13 | 14 | 15 | F |
| 16 | 17 | 18 | 19 | 20 | | |
| C | H | D | | | | |
| 21 | 22 | 23 | 24 | 25 | | |

A Magical Square.

| A | B |
|----|----|
| 11 | 24 |
| 4 | 12 |
| 17 | 5 |
| 10 | 18 |
| 23 | 6 |
| C | D |
| 19 | 2 |
| 2 | 15 |

Any five of these sums taken in a right line make You will observe that five numbers in the diagonals A to and B to C, of the magical square, answer to the ranks E and F, and G to H, in the natural square, and that 13 is central number of both squares.

To form a magical square, first transpose the two rows in the natural square to the diagonals of the magical square; then place the number 1 under the central number 13, and the number 2 in the next diagonal downward. The number 8 should be placed in the same diagonal line; but there is no room in the square, you are to place it in the part it would occupy if another square were placed und

this. For the same reason, the number 4, by following the diagonal direction, falling out of the square, it is to be put into the part it would hold in another square, placed by the side of this. You then proceed to numbers 5 and 6, still descending; but as the place 6 should hold is already filled, you then go back to the diagonal, and consequently place the 6 in the second case under the 5, so that there may remain an empty space between the two numbers. The same rule is to be observed whenever you find a space already filled.

You proceed in this manner to fill all the empty cases in the angle where the 15 is placed; and as there is no space for the 16 in the same diagonal, descending, you must place it in the part it would hold in another square, and continue the same plan till all the spaces are filled. This method will serve equally for all sorts of arithmetical progressions composed of odd numbers; even numbers being too complicated to afford any amusement.

To MAKE ANY NUMBER DIVISIBLE BY NINE.

Tell any one to write down any number as high as he pleases. Add up the digits as he does it. See what number is wanting to make the *sum* of them divisible by nine. Tell him to place this number anywhere he pleases in the number, and you will find it divisible by nine.

Thus, suppose the number to be 72,857, these added up make 29. Then tell him to put 7 anywhere he pleases, the result will be divisible by nine. Thus, if he puts it between

8 and 5,—728757. For if the sum of the digits of any number be divisible by nine, the number itself is so also.

THE HORSE-DEALER'S BARGAIN.

A horse-dealer, who was refused the price he asked for his horse, viz., £1,000, induced the gentleman who refused to pay that sum, to become the purchaser by offering to let him have the animal for the value of the twenty-fourth nail in his shoes, reckoning one farthing for the first nail, two for the second, four for the third, and so on, to the twenty-fourth. The gentleman, thinking it a bargain, gladly accepted the offer; the value of the horse was, therefore, necessarily great. By calculation, the twenty-fourth term of the progression, 1, 2, 4, 8, &c., will be found to be 8,388,608, equal to the number of farthings the purchaser gave for the horse; the price consequently amounted to £8,738 2s. 8d.

HOW TO MAKE A PEN FOR 100 SHEEP HOLD 200 BY THE ADDITION OF TWO MORE HURDLES.

In the original pen, or that which holds the hundred sheep, the hurdles must be so disposed that there shall be only one at the top and bottom. It is then obvious that, if one hurdle more be placed at each end, and those on one side moved back so as to admit the other two, the enclosed space must necessarily be doubled, and thus rendered capable of holding twice as many sheep.



LEGERDEMAIN.





LEGERDEMAIN; OR, THE CONJURER.

THE Eastern nations, from the earliest times, possessed jugglers of many kinds, some of whom made a livelihood by going from place to place, and performing various tricks and feats by which the judgment was bewildered and the reason bamboozled; and even now the performers of the East infinitely excel those of the West. In the

Norman times the juggler was termed *jongleur*, or *joculator*, and united in one the minstrel, astrologer, and merry-andrew. In the fourteenth century, he seems to have become more entirely a performer of tricks and feats, and bore the name of *Tregetour*. The tregetours were adepts at every kind of sleight of hand, and by the assistance of machinery of various kinds, deceived the eyes of the spectators, and produced such illusions as were usually supposed to be the effect of enchantment, for which reason they were frequently ranked with sorcerers, magicians, and wizards. Chaucer, who no doubt had frequently an opportunity of seeing the tricks exhibited by the tregetours of his time, says, "There I sawe playenge jogelours, magyciens, tregeteours, phetonysses, charmeresses, old witches, and sorcerers."

The following pages are not intended to make the young reader either a cheat or a trickster; there is nothing, perhaps, so utterly contemptible in every-day life, as trickery and deception, and we would caution our young friends not to obtain by these amusements a love of deception, which is only allowable in such feats of amusement, and which is in no way culpable, when every one knows he is deceived. But we would advise him strongly to cultivate in his own mind the virtues of sincerity, straightforwardness, candour, openness, and truth; to shun subterfuge and deception as he would a venomous reptile; and to hate a lie as he would hate that same old gentleman whom we are too polite to name, and who is the father of lies.

With this sage advice, we shall present a collection of

amusing conjuring tricks, preferring those which require no apparatus, or, at least, none but what may be readily made or procured at a trifling cost.

THE FLYING SIXPENCE.

This trick must be frequently practised before it is produced in public.

Borrow two coloured silk handkerchiefs from the company, and have *three* sixpences in your hand, but only show *two*, keeping the other one firmly fixed against the first joint of the second and third fingers. You must also have a fine needle and thread stuck inside the cuff of your coat. Then take one of the handkerchiefs, and put in *both* sixpences, but pretend that only *one* is in the handkerchief; then put the handkerchief into a hat, leaving one corner hanging out. Now hold the *third* sixpence (which the spectators imagine is the *second*), and ask one of the company to lay the second handkerchief over it. You then ask him to hold the sixpence tight between his finger and thumb, whilst you twist up the handkerchief. While doing so, with both hands concealed under the handkerchief, you pass a few stitches under the sixpence, and replace the needle. This being done, spread one corner of the handkerchief over the hand of the person who is still holding the sixpence, and, taking hold of another corner, tell him to drop the sixpence when you have counted three. At the word "three," he lets go the sixpence, and you whisk the handkerchief into the air, when the sixpence

appears to have vanished, but is really held in the handkerchief. You then tell the astonished individual to draw the other handkerchief out of the hat by the corner that is hanging out. The two sixpences are heard to fall into the hat, and every one is persuaded that you have conjured one of the sixpences out of a person's hand, and sent it into the hat.

ANOTHER METHOD.

Perhaps the spectators may ask to see it again, or demand to mark the sixpence. In this case, vary it as follows. Ask some one (always choose the most incredulous of the party) to mark a sixpence of his own, and give it you. Take the same handkerchief, and give him the sixpence to hold that is already inclosed in it, as in the last trick, dropping the marked sixpence into the palm of your hand. Twist it up as before, and then leave it entirely in his hands. Direct him to place it on a table, and cover it with a basin or saucer. Ask him to give you a cup or tumbler, and hold it under the table, beneath the place where the saucer is. Then tell him to knock three times on the saucer, and at the third knock let the marked sixpence fall into the tumbler. Hand the tumbler, and while he is examining the sixpence to see if it is the same one that he marked, take up the saucer, and shake out the handkerchief that is lying under it, as in the last trick. You must then return the handkerchief, and while you pretend to be searching for the marks, draw out the thread

that held the sixpence, and drop the coin into the palm of your hand, taking care to rub between your finger and thumb the spot where the threads had been, in order to eradicate the marks. This variation seldom fails to confuse the company.

You must remember to keep talking the whole time, and always try to make a joke, or otherwise to distract the attention of the audience, while you are executing the necessary changes.

TO GET A RING OUT OF A HANDKERCHIEF.

Bend a piece of gold wire into the form of a ring, having previously sharpened both ends. You have a real ring made of the same piece of wire, and concealing the false ring in the palm of your hand, offer the real one to be inspected. When it is returned, borrow a handkerchief, and while taking it from the lender, slip the real ring into your left hand, and take the false one at its point of junction. Throw the hankerchief over the ring, and give it to some one to hold between his finger and thumb. Let the handkerchief fall over it, and give a piece of string to a second spectator, directing him to tie it round the handkerchief, about two inches below the ring, so as to inclose it in a bag, and tell him to do so as tightly as he can. While he is doing this, take up your conjuring wand, a rod of some hard wood, about eighteen inches long, and when the knot is tied, step forward, passing the rod into your left hand, taking care to slip over it the real ring.

which has lain concealed there. Slip your left hand to the centre of the rod, and direct each of the two persons to hold one end of it in his right hand. Then tell the one who has the ring and handkerchief, to lay them on your left hand, which you immediately cover with your right. Then tell them to spread another handkerchief over your hands, and to say after you any nonsense that you like to invent.

While they are so doing, unbend the false ring, and draw it through the handkerchiefs by one of its points, carefully rubbing between the thumb and finger the place where it came through. Hang the empty handkerchief over the ring which is on the rod, and take away your hands, which you exhibit empty, as you have stuck the false ring inside the cuff. Take away the upper handkerchief, and let a third person come to examine, when he will find the ring gone out of the handkerchief, and hung upon the rod.

TO PUT NUTS INTO YOUR EAR.

Take three nuts in the left hand, show them, and take out one of them between your right finger and thumb, and another between the first and third finger. This latter is not seen by the company. You then put one of them in your mouth and retain it there, unknown to the spectators, while you exhibit the second as the one that you put into your mouth. This second one you carry to your ear, as if you meant to insert it there, and on replacing it in your

left hand, only two nuts will be left instead of three, the third of which appears to have gone into your ear.

To CRACK WALNUTS IN YOUR ELBOW.

Conceal a very strong walnut in your right hand, and take two other walnuts out of the dish. Place one of them on the joint of your arm, and say that you are going to break it by the power of your muscles. You will now have one walnut in your arm and two in your right hand. Close your left arm, and strike it an apparently violent blow with the right hand, at the same time clenching the right hand violently, which will smash the second walnut in it, and the spectators hearing the crash will be sure to fancy that it is caused by the demolition of the walnut in your arm. Then open your arm very gently (for fear of dropping any of the fragments, you must say), and, when pretending to take out the walnut which you had placed there, you substitute for it the broken one from your right hand.

To TAKE FEATHERS OUT OF AN EMPTY HANDKERCHIEF.

Procure four or five large plumes, such as are worn by officers. Take off your coat, and lay the plumes along your arms, the stem being toward your hand. Now put on your coat again, and the feathers will lie quite smoothly and unsuspected. Borrow a handkerchief from one of the spectators, and wave it about to show that it is empty. Throw it over your left arm, and with the right draw out

one of the plumes from up the coat-sleeve, at the same time giving it a flourish in the air, which will loosen all the fibres of the feather, and make it appear much too large to have been concealed about the person. Wave the handkerchief again, and repeat the operation until all the plumes are gone. You can carry enough plumes under the sleeve to cover a table with, and if you prepare a board or an ornamental vase full of holes, you can place the plumes upright as you take them out.

THE KNOTTED HANDKERCHIEF.

This feat consists in tying a number of hard knots in a handkerchief borrowed from one of the company, then letting any person hold the knots, and by the operator merely shaking the handkerchief, all the knots become loosened, and the handkerchief is restored to its original state.

To perform this excellent trick, get as soft a handkerchief as possible, and taking the opposite ends, one in each hand, throw the right hand over the left, and draw it through, as if you were going to tie a knot in the usual way. Again throw the right end over the left, and give the left-hand end to some person to pull, you at the same time pulling the right-hand end with your right hand, while your left hand holds the handkerchief just behind the knot. Press the thumb of your left hand against the knot to prevent its slipping, always taking care to let the person to whom you gave one end pull first : so that, in fact, he is only pulling against your *left hand*.

You now tie another knot exactly in the same way as the first, taking care always to throw the right-hand end over the left. As you go on tying the knots, you will find the right-hand end of the handkerchief decreasing considerably in length, while the left-hand one remains nearly as long as at first; because, in fact, you are merely tying the right-hand end *round the left*. To prevent this from being noticed, you should stoop down a little after each knot, and pretend to pull the knots tighter; while, at the same time, you press the thumb of the right hand against the knot, and with the fingers and palm of the same hand, draw the handkerchief, so as to make the left-hand end shorter, keeping it at each knot as nearly the length of the right-hand end as possible.

When you have tied as many knots as the handkerchief will admit of, hand them round for the company to feel that they are firm knots; then hold the handkerchief in your right hand, just below the knots, and with the left hand turn the loose part of the centre of the handkerchief over them, desiring some person to hold them. Before they take the handkerchief in hand, you draw out the right-hand end of the handkerchief, which you have in the right hand, and which you may easily do, and the knots being still held together by the loose part of the handkerchief, the person who holds the handkerchief will declare he feels them: you then take hold of one of the ends of the handkerchief which hangs down, and desire him to repeat after you, one, two, three; then tell him to let go, when,

by
2 -

iving the handkerchief a smart shake, the whole of the knots will become loose.

Should you, by accident, whilst tying the knots, give the wrong end to be pulled, a hard knot will be the consequence, and you will know when this has happened the instant you try to draw the left-hand end of the handkerchief shorter. You must, therefore, turn this mistake to the best advantage, by asking any one of the company to see how long it will take him to untie one knot, you counting the seconds. When he has untied the knot, your other knots will remain right as they were before. Having finished tying the knots, let the same person hold them, and tell him that, as he took two minutes to untie one knot, he ought to allow you fourteen minutes to untie one seven; but as you do not wish to take any advantage, you will be satisfied with fourteen seconds.

You may excite some laughter during the performance of the trick, by desiring those who pull the knots all with you, to pull as hard as they please, and not to be afraid, as the handkerchief is not yours; you may likewise go to the owner of the handkerchief, and desire to assist you in pulling a knot, saying, that if the handkerchief is to be torn, it is only right that he should have a share of it; you may likewise say that he does not pull very hard, which will cause a laugh against him.

THE NUT TRICK.

To perform this clever trick with dexterity before a "small party," is at once to become the hero of the evening. The nut trick is exhibited thus:—You hand the audience a dessert plate and a cambric handkerchief for examination; these being returned, place the plate upon a table near you; the handkerchief is then spread out quite flat over the plate. At command, sugared almonds, nuts, and comfits pour into the dessert plate, the instant the handkerchief is lifted up, producing an effect that would astonish the magi of old. The way in which it is done is this:—Make a calico bag large enough to hold the nuts and sweetmeats you intend to distribute, exactly to the pattern of a nightcap, or the letter A; a small selvage is turned up at the bottom of the bag; procure two pieces of watch-spring, and bend them quite flat, each spring to be exactly half the diameter of the bag. These are put into the selvage, and sewn up firm. When the bag is opened, it will close itself in consequence of the springs. A long pin is passed through the top of the bag and bent round hook-shape. If the bag now be filled with nuts, &c., it may be suspended by the hook, without any danger of the nuts or anything else falling out; because, although the mouth of the bag is downwards, the springs keep it shut. When this trick is to be shown, the prepared bag is hung on the side of the table that is away from the audience. The plate is also placed on that side;

hide the bag. The left hand is now used to draw the handkerchief and to press the bag; this causes it to open, and out fall the "good things" upon the table. This causes sufficient diversion for the merest conjurer to drop the bag behind the table under the advances to the audience, politely inquiring, "Will you take a few nuts or sweetmeats?"

CONJURING A RING.

Several very marvellous tricks can be shown ordinary finger-ring, such as passing it through a basin, an ale-glass, or a plate, then or nest of boxes, and other feats of a similar kind. These tricks are so good that they are always shown by the professors of magic parties, but are never explained; however,

the handkerchief can then be shaken, folded, and crumpled up in the hands, so as to make it appear "all fair." Now, to pass a ring through a drinking-glass and plate, and through the table on which it is placed. "If any lady or gentleman will kindly lend me a ring, I shall be happy to exhibit." Take the borrowed ring in the LEFT hand, and keep it there; pretend to pass it to the right hand, and say, "I will place it in the handkerchief. Who will kindly hold it for me while I put the glass on the plate in the centre of the table?" While you thus freely ask who will hold the handkerchief, you will secure the most bashful lady or gentleman in the company to hold the (your) ring in the handkerchief. "You will perceive, ladies and gentlemen, that the glass and plate are now quite empty. I shall now place the glass in the plate on the centre of the table, and request the lady (or gentleman) to put the ring and the handkerchief over the glass. I particularly draw your attention to the fact that you will *hear* the ring fall into the glass when I request it to be released. You will then be certain that it is in the glass; but at my command it shall pass into this box (show the box round), which I shall place under the table. Now, miss (or sir) be good enough to let the ring fall into the glass. Silence! Ting! You heard it fall?" "Yes," all must reply except the deaf. "Presto! It is now in the box." You lift the handkerchief, smooth down your brow with it, and put it into your pocket. The audience are now left to themselves. They rush to the plate and glass, it is not there;

now the box, behold ! it is as sound as ever : how it got there Aunt Carry could never tell, but you could, for you put it there out of your left hand when you placed the box under the table.

THE ERRATIC EGG.

This trick is to transfer the egg from one wine-glass to the other, and back again to its original position, without touching the egg or glasses, or allowing any other person or any thing to touch them. It is performed very easily, since all that you have to do is to blow smartly on one side of the egg, and it will hop into the next glass ; repeat this and it will hop back again.

THE PRISONER RELEASED.

Place a sixpence in the bottom of a glass, and over the latter put a half-crown. The puzzle is to remove the small coin from beneath the larger one, without touching either of the coins, or touching or upsetting the glass. To do this capital trick you must blow with considerable force down one side of the glass upon the edge of the half-crown. The sixpence will be expelled by the force of the air, and will fall upon the upper surface of the half-crown or upon the table. A little practice will render the performance of this feat very easy.

ADVANTAGEOUS WAGER.

Request a lady to lend you a watch. Examine it, and give a guess as to its value ; then offer to lay the owner a

wager, considerably below the real value of the watch, that she will not answer "My watch" to three questions you will put to her consecutively. Show her the watch, and say, "What is this which I hold in my hand?" she, of course, will not fail to reply, "My watch." Next, present to her notice some other object, repeating the same question. If she name the object you present, she loses the wager; but if she be on her guard, and remembering her stake, she says, "My watch," she must, of course win; and you, therefore, to divert her attention, should observe to her, "You are certain to win the stake, but, supposing I lose, what will you give me?" and if, confident of success, she replies for the third time, "My watch," then take it, and leave her the wager agreed on.

THE DOUBLE MEANING.

Place a glass of any liquor upon the table, put a hat over it, and say, "I will engage to drink the liquor under that hat, and yet I will not touch the hat." You then get under the table, and after giving three knocks, you make a noise with your mouth as if you were swallowing the liquor. Then getting from under the table, you say, "Now, gentlemen, be pleased to look." Some one, eager to see if you drank the liquor, will raise up the hat, when you instantly take the glass, and drink the contents, saying, "Gentlemen, I have fulfilled my promise. You are all witnesses that I did not touch the hat."

THE THREE SPOONS.

This is a capital trick, but it requires a confederate's aid. Place three silver spoons cross-wise on a table, request any person to touch one, and assure him you will find out the one he touches by a single inspection, although you will leave the room while he does so, and even if he touches it so gently as not to disarrange the order in which they are once put in the slightest degree. You retire; and when he gives you notice to enter, walk up to the table and inspect the spoons, as if trying to ascertain whether there are any finger-marks upon them, and then decide. Your confederate, of course, makes some sign, previously agreed upon, to give you notice which is the identical spoon; the actions may be, touching a button of his jacket for the top spoon, touching his chin for the second, and putting his finger to his lips may signify the lowest; but the precise actions are immaterial, so that the spoon they indicate may be understood.

THE CONJURER'S JOKE.

Take a little ball in each hand, and stretch your hands as far apart as you possibly can, one from the other; then tell the company that you will make both the balls come into which ever hand they please, without bringing the hands into contact with each other. If any of the lookers on challenge your ability of achieving this feat, all you have to do is to lay one of the balls down upon a table,

turn yourself round, and take it up with your other hand. Both the balls will thus be in one of your hands, without the latter approaching the other, agreeably to your promise.

To CAUSE WINE AND WATER TO CHANGE PLACES.

Fill a small narrow-necked bulb with port wine, or with water and coloured spirit of wine, and put the bulb into a tall, narrow glass jar, which is then to be filled up with cold water: immediately, the coloured fluid will issue from the bulb, and accumulate on the surface of the water in the jar, while colourless water will be seen accumulating at the bottom of the bulb. By close inspection, the descending current of the water may also be observed, and the coloured and the colourless liquids be seen to pass each other in the narrow neck of the bulb without mixing. The whole of the coloured fluid will shortly have ascended, and the bulb will be entirely filled with clear water.

- Is IT POSSIBLE?

Side by side place three pieces of anything (money is most convenient), then take away the middle piece without touching it.

By removing the right-hand piece to the side of the left, you thus take away the centre without touching it.

THE TOPER'S STRATAGEM.

Get a bottle full of water, with the cork driven tightly in, and the top of it level with the neck of the bottle.

You must remove the cork from the bottle without touching the cork with anything, and without injuring the bottle.

Wrap a towel round the bottom of the bottle, and strike it evenly and repeatedly, but not too hard, against a wall, post, or tree, and after some time the cork will be driven out of the bottle.

THE IMPOSSIBLE OMELET.

Produce some butter, eggs, and other ingredients for making an omelet, together with a frying-pan, in a room where there is a fire, and offer to bet a wager that the cleverest cook will not be able to make an omelet with them. The wager is won by having previously caused the eggs to be boiled very hard.

NEW PERPETUAL ROTARY MOTION.

By an accidental occurrence, it has recently been discovered that a piece of rock-crystal, or quartz, cut in a peculiar form, produces, upon an inclined plane, and without any apparent impetus, an extraordinary rotary motion, which may be kept up for an indefinite period of time. The curiosity of this philosophical toy having excited general interest in the scientific world, Professor Leslie, in his lecture, thus explains the phenomenon:—

“The crystal has six sides, and being cut accurately from the faces to a perfect convex surface, and held parallel, no motion will take place, because the centre of gravity of each face is balanced and supported in this position of the

plane surface; but if a slight inclination be given to the plane, a rotary motion commences, in consequence of the support being removed from the centre of gravity. The impetus once given, the centrifugal force increases the rotary motion to such a degree, as for an observer to be unable to distinguish the form of the crystal.

“To produce the effect.—Place the crystal on a piece of plate or common window glass, a china, or glazed plate, or any smooth surface, perfectly clean, as grease or a particle of dust would impede its motion. Wet the surface, and give the plane a slight inclination, when, if properly managed, a rotary motion will commence, which may be kept up for any length of time by giving alternate inclinations to the plane surface, according to the movements of the crystal; to heighten the pleasing effect of which, a variety of paper figures, harlequins, waltzers, &c., may be attached. The first trial of the experiment had better be made by giving a slight rotary motion to the crystal.”

THE MIRACULOUS APPLE.

To divide an apple into several parts, without breaking the rind. Pass a needle and thread under the rind of the apple, which is easily done by putting the needle in again at the same hole it came out of; and so passing on till you have gone round the apple. Then take both ends of the thread in your hands and draw it out, by which means the apple will be divided into two parts. In the same manner, you may divide it into as many parts as you please, and

yet the rind will remain entire. Present the apple to any one to peel, and it will immediately fall to pieces.

AN OMELET COOKED IN A HAT, OVER THE FLAME OF A CANDLE.

State that you are about to cook an omelet; then you break four eggs in a hat, place the hat for a short time over the flame of a candle, and shortly after produce an omelet, completely cooked, and quite hot.

Some persons will be credulous enough to believe that by the help of certain ingredients you have been enabled to cook the omelet without fire; but the secret of the trick is, that the omelet had been previously cooked and placed in the hat, but could not be seen, because the operator, when breaking the eggs, placed it too high for the spectators to observe the contents. The eggs were empty ones, the contents having been previously extracted, by being sucked through a small aperture; but to prevent the company from suspecting this, the operator should, as if by accident, let a full egg fall on the table, which breaking induces a belief that the others are also full.

THE DISAPPEARING SIXPENCE.

Provide yourself with a piece of India-rubber cord about twelve inches long, and a sixpence with a hold on the edge; attach the sixpence to the cord with a piece of white sewing silk, and after having done this sew the cord to your coat-sleeve lining, but be very careful and ascer-

tain that the end upon which the sixpence is attached does not extend lower than within two inches of the extreme end of the sleeve when the coat is on. It is better to have the sixpence in the left-arm sleeve. Having done this, bring down the sixpence with the right hand, and place it between the thumb and index finger of the left hand, and, showing it to the company, tell them that you will give the coin to any person who will not let it slip away. You must then select one of the audience, to whom you proffer the sixpence, and just as he is about to receive it, you must let it slip from between your fingers, and the contraction of the elastic cord will make the coin disappear up your sleeve, much to the astonishment of the person who thinks he is about to receive it. This feat can be varied by pretending to wrap the coin in a piece of paper or a handkerchief. Great care should be taken not to let any part of the cord be seen, as this would, of course, discover the trick. This is one of the most surprising feats of legerdemain, and its chief beauty consists in its extreme simplicity. The writer has frequently astonished a whole room full of company by the performance of this trick.

THE FISH AND INK TRICK.

This is really a first-rate delusion. You bring before the spectators a glass vase, full of ink. You dip a ladle into it, and pour out some of the ink upon a plate, in order to convince the audience that the substance in the vase is really ink. You then throw a handkerchief over the vase,

and instantly withdraw it, when the vase is found to be filled with pure water, in which a couple of gold-fish are swimming.

This apparent impossibility is performed as follows. To the interior of the vessel is fitted a black silk lining, which adheres closely to the sides when pressed by the water, and which is withdrawn inside the handkerchief during the performance of this trick. The ladle has a hollow handle with an opening into the bowl, in the handle is a spoonful or so of ink, which runs into the bowl when it is held downward, during the act of dipping it into the vase.

THE SIXPENCE IN THE BALL OF WORSTED.

Get a tinman to make a flat tin tube, which will just allow a sixpence to pass through it. Wind a quantity of worsted round it, so as to make it into a ball.

These preliminaries having been accomplished, perform any trick that will get a sixpence (previously marked) out of sight. Then tell the spectators that you will bring the marked sixpence into the middle of a ball of worsted. Take down the ball from the place where it is lying, drop the sixpence into the tube, and withdraw the tube, leaving the sixpence in the ball. A good squeeze or two will hold it tight, and obliterate every mark of the tube. Place the ball in a tumbler, take the end of the worsted, and give it to some one to unwind. This being done, the sixpence will be found in the very centre of the ball, with the end of the worsted wrapped tightly round it.

THE EGG AND BAG TRICK.

Get a chintz or cloth bag made double, and between the two bags make six or seven pockets, each of which will hold an egg, and have an opening into the bag. Fill the pockets with eggs, and you are ready for the performance.

Hold the bag by the place where the eggs are, shake it, turn it inside out, and show that there is nothing in it. Then tell the spectators that you are sure there is a hen in the bag. Put your head near the mouth of the bag, and make a clucking like a hen. You then say, "I knew I was right, and she has laid an egg." So saying, you put your hand into the bag and take out one of the eggs, taking care to pretend to grope in one of the corners for it.

This is repeated until all the eggs but one are gone. You then, after taking out the last egg, say that some people think the eggs are not real, but you will convince them by ocular inspection. Saying this, you break the egg in a saucer with your right hand, and while the people are occupied with it, you drop the bag behind your table, or hang it on a hook out of sight, and take up another exactly like it, into which you have put a hen. "These are real eggs," you then say, "and if any one doubts their reality, they cannot doubt that this is a real hen." You then turn the bag upside down, and shake out the hen. If any one wishes to inspect the bag, he can do so without being much the wiser for it.



a crooked pin. Borrow a small stick from spectators, and as you go behind your table hook the bent pin into your coat, passing it over your shoulder. Then place the egg on an inverted hat, and play upon it with music, and directly it begins to sound, a slight perceptible depression or elevation of the stick will cause the egg to twist and roll about upon it as if it had life. You must be careful to turn gently now and then, and apparently to vary the distance of the egg from

THE FIRE-EATER.

If the young conjurer is desirous of appearing in the character of a fire-eater, it is very easily managed. He must prepare a piece of thick string, by soaking it in a strong solution of nitre, and then drying it. He cuts off a piece about an inch in length, lights one end, and waves it over a piece of tow which he holds in his left hand. In a moment trifling smoke will be consumed by a huge burst of flame.

the piece which he has already chewed. By taking breath through the nostrils, and breathing it out through the mouth, smoke begins to issue forth, and the whole interior of the mouth is soon lighted up with a glow. When the mouth is shut and the tow pressed together, the fire goes out, except the piece of prepared string. More tow is then taken into the mouth, and treated in the same manner.

THE MAGIC SHILLING.

Procure a small round box, about one inch deep, to which fit accurately a shilling: line the box with any dark paper (crimson, for instance), and paste some of it on one side of the coin, so that when it lies in the lower part of the box it shall appear like the real box. This shilling is concealed in the hand, and before performing the trick, it will heighten the effect if a number of single shillings are hidden about the room, in places known to yourself. Having borrowed a coin, you dexterously place this on one side, and substitute the prepared one; and putting it gravely into the box, ask all to be sure they have seen it enter: when the lid is on, shake up and down—the noise betrays the metal; now command it to disappear, and shake laterally from side to side; as the shilling is made to fit accurately, no noise is apparent—the coin seems to be gone; in proof of which you open the box, and display the interior; the paper on the coin conceals it: whilst you direct the audience to look into a book, or a pair of tippers for the missing shilling, the prepared coin can be



THE HATCHED BIRD.

Separate an egg in the middle as near empty it, and then, with a fine piece of paper glue, join the two halves together, having a canary bird inside it, which will continue up some time, provided you make a small paper shell to supply the bird with air; have, also, in readiness. Present the two eggs for one to put the egg which contains the bird next to who is to choose, and for this purpose be a lady; she naturally chooses the nearest to having no idea of the trick to be performed. There is no apparent reason to take the further one; the wrong one being taken, you do not fail in the break the egg, and say, "You see that this is fresh, madam; as you would have found the bird had chosen it. Now, do you choose to find

THE VANISHED THREEPENNY PIECE.

Put a little wax on the nail of the middle finger of the right hand, and take a threepenny piece into the palm of the same hand. Close the hand, pressing the wax on the coin. Then rapidly open it, and the silver piece will adhere to the wax, and be quite concealed behind the finger when you hold your hand up, palm to the audience.

THE RESTORED DOCUMENT.

Make a memorandum-book, and line the cover with paper which has previously been rubbed with a mixture of lamp-black and oil. The paper must be loosely fixed, so that it can be raised up, and a leaf from the memorandum-book placed under it. You must also make a flat box, having a double opening.

You now take a leaf out of the memorandum-book, and ask some one to write a sentence, at the same time offering him the book to write upon. The pencil with which you furnish him is very hard, and he is forced to press upon the paper in order to mark. In so doing, the black is transferred by the pressure of the pencil from the blackened paper to the white leaf that is placed under it, and of course makes an exact copy of the writing. You then give the man his document, put the memorandum-book in your pocket, and go out of the room to fetch your box, which you have *forgotten*. While you are out of the room, you take out the leaf from under the black paper, and put it



the table, strike it with your wand, and th
as at first, you produce the duplicate le
writer acknowledges to be his own handw
lamp-black should have come off and sme
you can account for it by observing that it i
to get rid of all traces of the burning.

THE DANCING AUTOMATON.

Procure a piece of silk thread about six
fasten a small wire hook at one end, and a
the other, then make a knot in the thread al
from the end upon which the hook is faster
procure a small pasteboard figure about fou
and pierce a hole through the centre of the s

slip on the thread until it reaches the knot, being careful to retain the needle still in your hand, then whistle any air the company may suggest, and appear to beat time with your hands upon your knees. This will make the figure dance, to the great astonishment of the spectators. After you have continued this for a few minutes, you must drop the needle and pick up the figure, when the needle will again slide through the hole in the figure, and the automaton being free from the thread, you can hand it to the audience for examination. This is an excellent trick for the parlour, and, if well performed, will defy detection.

THE INVISIBLE SPRINGS.

Take two pieces of white cotton *cord*, precisely alike in length; double each of them separately, so that their ends meet; then tie them together very neatly, with a bit of fine cotton *thread*, at the part where they double (*i.e.* the middle). This must all be done beforehand. When you are going to exhibit the trick, hand round two other pieces of cord exactly similar in length and appearance to those which you have prepared, but not tied, and desire your company to examine them. You then turn to your table, placing these cords at the edge, so that they fall (apparently accidentally) to the ground, behind the table; stoop to pick them up, but take up the prepared ones instead, which you had previously placed there, and lay *them* on the table. You then take round for examination three ivory rings; those given to children when teething, and

THE BOY'S HOLIDAY BOOK.

ich may be had at any of the toyshops, are the best for our purpose. When the rings have undergone a sufficient rutiny, pass the prepared double cords through them and give the two ends of one cord to one person to hold, and the two ends of the other to another. Do not let them pull hard, or the thread will break, and your trick be discovered. Request the two persons to approach each other, and desire each to give you one end of the cord which he holds, leaving to him the choice.

You then say, that, to make all fast, you will tie these two ends together, which you do, bringing the knot down so as to touch the rings; and returning to each person the end of the cord next to him, you state that this trick is performed by the rule of contrary, and that when you desire them to pull hard they are to slacken, and vice versa which is likely to create much laughter, as they are certain to make many mistakes at first. During this time you are holding the rings on the fore-fingers of each hand, with the other fingers preventing your assistants from separating the cords prematurely, during their mistake you at length desire them, in a loud voice, to slack, they will pull hard, which will break the thread, the remaining in your hands, whilst the strings will remain unbroken: let them be again examined, and desire them to look for the springs in the rings.

THE FLIGHT OF THE RING.

You may cause a ring to shift from one hand to another, and make it go on any finger required on the other hand, while somebody holds both your arms, in order to prevent communication between them, by attending to these instructions : Desire some lady in company to lend you a gold ring, recommending her at the same time to make a mark on it, that she may know it again. Have a gold ring of your own, which fasten by a small piece of catgut string to a watch-barrel, and sew it to the left sleeve of your coat. Take the ring that is given you in your right hand ; then putting, with dexterity, the other ring fastened to the watch-barrel near the entrance of your sleeve, draw it privately to the fingers' ends of your left hand. During this operation, hide the ring that has been lent you between the fingers of your right hand, and fasten it dexterously on a little hook sewed for the purpose on your waistcoat, and hidden by your coat. After that, show your ring, which hold in your left hand ; then ask the company on which finger of the other hand they wish it to pass. During this interval, and as soon as the answer has been given, put the before-mentioned finger on the little hook, in order to slip the ring on it : at that moment let go the other ring, by opening your fingers. The spring which is in the watch-barrel, being confined no longer, will contract, and make the ring slip under the sleeve, without anybody perceiving it, not even those who hold your arms, as their

attention will be occupied to prevent your hands from communicating. After this operation, show the assembly that the ring is come on the other hand, and make them remark that it is the same that had been lent to you, or that the mark is right. Much dexterity is required in this trick, so that the deception may not be suspected.

TO SHOW THE PRESSURE OF THE ATMOSPHERE.

Fill a wine-glass with water; put a sheet of paper over it; lay your hand on the paper, and quickly turn the glass over. Now remove the hand, and the paper will remain and not a drop of water come out.

TO FORM FIGURES IN RELIEF ON AN EGG.

Design on the shell any figure or ornament you please, with melted tallow, or any other fat, oily substance; then immerse the egg into very strong vinegar, and let it remain till the acid has corroded that part of the shell which is not covered with the greasy matter; those parts will then appear in relief, exactly as you have drawn them.

BOTTLE-IMPS.

The requisites for this experiment are a glass vase about fifteen inches high, and three little glass figures, hollow, with a small hole in each of their legs. These may be obtained at the glass-houses, and may be blown to re-

present harlequin, columbine, pantaloons, &c., or imps, or any other figure to the fancy of the exhibitor. The vase is to be nearly filled with water, the figures immersed so as not to allow the air within them to escape, and the top of the vase to be covered with a bladder, and tied tight. There must be a small space between the surface of the water and the bladder, which will of course be occupied with air. If you then press your hand on the top, the figures will sink, and as you lighten the pressure, they will rise. By these means you may give them the appearance of dancing about the glass at your pleasure.



SECRET CORRESPONDENCE.

To carry on a correspondence, without the possibility of the meaning of the letter being detected, in case it should be opened by any other person, has employed the ingenuity of many. No method will be found more effectual for this purpose, or more easy, than the following:—

Provide a piece of square card or pasteboard, and draw a circle on it, which circle is to be divided into 27 equal parts, in each of which parts must be written *one* of the capital letters of the alphabet, and the &. Let the centre of this circle be blank. Then draw another circle, also divided into 27 equal parts, in each of which write one of the small letters of the alphabet, and the &. This circle must be

cut round, and made exactly to fit the blank space in the centre of the larger circle, and must run round a pivot or pin. The person with whom you correspond must have a similar dial, and at the beginning of your letter you must put the capital letter, and at the end the small letter, which answer to each other when you have fixed your dial.

THE CONJURER'S BRIDGE.

This is an amusing operation, that may be effected with three table-knives, three tobacco-pipes, three pieces of stick, or any other light articles of corresponding length. In a domestic circle, it may be prettily shown with three wine-glasses and three knives. Place the three glasses at the corners of a supposed triangle, equidistant from each other, and nearly as far apart as the length of the knives. Place the handles of two of the knives each on one of the glasses, so that the end of the blades, when brought to the centre of the triangle, will cross each other. Then place the handle of the third knife on the edge of the glass, as you have done the other, but bring the blade of it, not above or below, but between the blades of the two other knives. The result will be, that they will sustain one another so perfectly as to admit of a considerable weight being placed on the centre, without deranging them.

This feat may be performed with three tobacco-pipes, without the aid of glasses or cups to elevate them, the hollow of the bowl being turned on the table, and thus made the basis to support the bridge formed of the arms of the pipes.

TO SO FILL A GLASS WITH WATER THAT IT CANNOT BE REMOVED
WITHOUT SPILLING THE WHOLE.

This is a mere trick, but may afford some amusement. You offer to bet any person that you will so fill a glass with water that he shall not move it off the table without spilling the whole contents. You then fill the glass, and laying a piece of paper or thin card over the top, you dexterously turn the glass upside down on the table, and then, drawing away the paper, you leave the water in the glass with its foot upwards. It will therefore be impossible to remove the glass from the table without spilling every drop.

THE WONDERFUL WAFERS.

On each side of a table-knife, place, in the presence of your company, three wafers. Take the knife by the handle, and turn it over two or three times, to show that the wafers are all on. Desire some person to take off one wafer from one side of the blade; turn the knife two or three times again, and there will appear only two wafers on each side: remove another wafer, turn the knife as before, and there will appear only one wafer on each side; take the third wafer away, turn the knife as before twice or thrice, and there will appear to be no wafer on either side. After a momentary pause, turn the knife again two or three times, and three wafers will appear on each side.

The secret of this capital trick consists in using wafers of

the same size and colour, and turning the knife, so that the same side is constantly presented to the view, and the wafers are taken off that side, one by one. The three wafers thus remain untouched on the other side, so that when you have first made it appear that there are no wafers on either side, you may, apparently, show three on each by the same means. The way to turn the knife is as follows: when you lift it up, turn it in your hand, with your finger and thumb, completely round, until the side that was uppermost when you lifted it come uppermost again. This is done in an instant, and is not perceptible, if adroitly managed.

A GHASTLY SPECTACLE.

Take a plate of salt; pour on it some spirits of wine, or gin; place it on the table, in the midst of a company. The corpse-like appearance of every face is startling to those who have not witnessed it. This operation might aid in a witch scene in a charade.

SINGULAR ACOUSTIC EXPERIMENTS.

Take a piece of coarse whipcord, and tie it in a noose. Let some one put the palms of his hands over his ears; then pass the noose over his hands, holding about twelve inches of the cord in your left hand; draw the thumb-nail of the other hand slowly along the cord: its vibrations will sound like the roll of thunder, and will be the more effective if varied in intensity.

Tie the middle of a string, about two feet long, round the neck of a large poker ; wrap the ends round each fore-finger ; then put the ends of your fingers into your ears ; knock the poker thus suspended against a hard substance. It will sound like the great bell of a cathedral.

TO MAKE A COIN APPEAR TO PASS THROUGH A TABLE.

Tie a halfpenny in the corner of your handkerchief unobserved. After a while, ask some one to lend you a halfpenny. Put your hand with this halfpenny in it into your handkerchief, appearing to show the shape of it through the handkerchief, but, in reality, showing the other ; then place the halfpenny covered with the handkerchief on the table, in sight of the company, covering it over with your left hand. Place your right hand with your friend's halfpenny under the table, striking the table with the palm of each hand. You then show the contents of your right hand, and shake the handkerchief with your left.

TO TAKE A SIXPENCE FROM UNDER A WINE-GLASS WITHOUT TOUCHING THE GLASS.

Place two shillings under opposite sides of an inverted wine-glass, under the middle of which is placed the sixpence ; then scrape the table-cloth gently towards you with your nail, and the sixpence will gradually follow till it is out.

ALPHABET OF THE DEAF AND DUMB.

THE art of communicating ideas by spelling with the fingers, or by other signs, is called Dactylogy. As early as the year 1584 there are records of men eminent for their learning and philanthropy having devoted their fortunes and abilities to the teaching of the deaf and dumb. It is therefore more than probable that, although we have no record of the fact, some system of conveying ideas by signs existed even at that early period. The German States were then the centre of civilization ; and it was from them that our country first became impressed with its deep moral obligations to this peculiarly afflicted and dependent class of our fellow-creatures. In 1680, Dalgarno, an Italian, who claimed the honour of being the first to publish a treatise on Dactylogy, invented and made known in England a Manual Alphabet, in which the vowels are represented by the tips of the fingers, and the consonants by the various joints and sections of the palm, as shown below :—

The conversation was carried on by touching the position of the vowels with any finger of the right hand, and the consonants with the thumb of the same hand.

This, undoubtedly the first Manual Alphabet used in England, was the basis of the various systems of Dactylogy now practised in this country and America. Some of these systems employ both hands, others only one. The latter mode is the one usually taught to the Deaf and Dumb in America.

The vowels are indicated by touching the thumb for *a*, the fore-finger for *e*, the second or middle finger for *i*, the next for *o*, and the little finger for *u*.

The consonants are thus formed:—

B.—Join the thumb and first finger of each hand, and place together the backs of the nails of the two fore-fingers.

C.—Form the letter as nearly as you can, with the thumb and fore-finger of the right hand.

D.—Form the letter by curving the thumb and fore-finger of the right hand, so as to resemble the bowl of the *D*, and placing the curve against the side of the left hand fore-finger, held perpendicularly.

F.—Place the fore-finger of the right hand across the two first fingers of the left hand.

G and *J* are both formed alike, by clenching each hand, and placing one, so clenched, upon the other.

H.—Draw the palm of the right hand across the left, from the wrist to the fingers' ends.

K.—Curve the fore-finger of the right hand toward the thumb, and place the second joint of the finger so curved against the back of the fore-finger of the left hand.

L.—Place the fore-finger of the right hand across the middle of the palm of the left, commencing at the under side, so that the end of the finger will lie between the thumb and fore-finger.

M.—Place the three first fingers of the right hand in the same way across the palm of the left.

N.—Place the two first fingers of the right hand in the same way across the palm of the left.

P.—Form the upper part of the letter with the thumb and fore-finger of the right hand, and place the curve against the two first joints of the fore-finger of the left hand.

Q.—Bring together the extremities of the thumb and fore-finger of the right hand; curve the fore-finger of the left hand, and connect it with the right hand at the point where the fore-finger and thumb touch each other.

R.—Bend the fore-finger of the right hand into the form of the upper part of the letter, and lay it on the palm of the other hand.

S.—Bend the little finger of each hand into a semicircle and link them together.

T.—Place the end of the fore-finger of the right hand to the centre of the lower edge of the palm of the other hand.

V.—Form the letter V by extending the two first fingers of the right hand on the palm of the left.

W.—Join the hands in the usual way of clenching them, by interlacing the fingers one within the other.

X.—Cross the two first fingers of each hand.

Y.—Form the letter, by extending the thumb and fore-finger of the left hand, and placing the fore-finger of the right hand so as to form the lower line of the letter.

Z.—Place the elbow of the right arm in the palm of the left hand, and raise the right hand up nearly to touch the face.

For those who already possess, in speech, a means of

communication more easy and more appropriate to all circumstances, Dactylography is little more than an ingenious puzzle; but not only to the deaf and dumb, but in an almost equal degree to the blind, the art is invaluable. As it addresses itself to the sense of feeling as well as to that of sight, it is easy to touch another person's hand, if he be acquainted with the hand alphabet, on such parts or portions as will enable him to comprehend the words or sentences delivered; and thus may conversation be carried on by the blind, or by the deaf and dumb in the dark.



CONUNDRUMS.

1. Why were there no postage stamps in Harry the Eighth's reign?
2. When is a boat like a knife?
3. When is money damp?
4. Why is a fly one of the tallest insects?
5. Why does a sailor know there is a man in the moon?
6. Which is the most modest piece of furniture?
7. What trade was the man who killed William Rufus?
8. Why are ladies like churches?
9. Why is the letter N like a pig?
10. Spell blind pig in two letters.
11. What is the difference between a fowl with one wing and one with two?
12. Why are the felt hats called wide-awakes?
13. When do cups and saucers make a good meal?
14. Why is a chrysalis like a hot roll?
15. Why is base coin like cherry-pie?
16. Why is Joseph Gillott a very wicked man?
17. Why are spectacles like hay and corn?
18. Why must a little man be an early riser?
19. When is soup likely to run out of the pot?
20. If a man be cast on an uninhabited island, what wind would desire?
21. If the eyes and nose ran a race which would most likely win?
22. Why can a person see farthest in a hop garden?
23. Why is a £5 note better than £5 sterling?
24. When were there only three vowels in the alphabet?

25. If a pair of horses were driven over a cliff, what heathen god would they invoke?
26. What train should a dull boy travel by?
27. Who was it missed the first parliamentary train?
28. What word is that composed of five letters from which, if you take two, one remains?
29. What is the pleasantest ship to embark in?
30. What is the difference between a butcher and a young lady?
31. Why is a young lady hemming a handkerchief for a rich young bachelor like an agriculturist?
32. Which are the four most corpulent letters in the alphabet?
33. Why should a chimney-sweep be a happy man?
34. Which is the most desirable county in England for benighted travellers?
35. Why can a gentleman never possess a short walking-stick?
36. What is the difference between a Puseyite and a Baptist?
37. Why are kisses like creation?
38. What is the difference between water and time?
39. What city in the United Kingdom would be likely to float in the event of a flood?
40. Why are Phoebe and Eliza like two opposite statements?
41. Which is the queen of roses?
42. Why is a chair that has had a new bottom put to it like a paid bill?
43. Why are ladies of the present day very dishonest?
44. Why is a new bonnet like a whipping?
45. What is that which is so brittle that if you name it you are sure to break it?
46. Why are fowls the most profitable things farmers keep?
47. Why does a donkey prefer thistles to corn?
48. Why is a fool's wit like a spendthrift's purse?
49. Why is true wit like a diamond?
50. Why is E the busiest letter in the alphabet?
51. Why is a pack of cards like a garden?
52. What word is that which is made shorter by adding a syllable to it?
53. What is most like a horse's shoe?

54. What was yesterday and will be to-morrow?
55. What thing is that which, the more we cut it, the longer it grows?
56. Why is rebellion like dram-drinking?
57. Why is a dancing-master like a tree?
58. Why is a horse in a stable like a tortured criminal?
59. Why is restored property like Exchequer bills?
60. Why is a gardener like a watch?
61. Why is life like a publican's door-post?
62. Why is a pepper-box like a saint?
63. Why are children at the breast like soldiers on a campaign?
64. What word of five syllables is that from which, if you take one syllable away, no syllable remains?
65. Where was Oliver Cromwell going in his last moments?
66. Why did the Queen and the late Prince Consort count ten in the census?
67. Why are gloves likely to be unsaleable articles?
68. What moral lesson does a weather-cock teach?
69. What does a stone become in the water?
70. Why is a baker like a beggar?
71. Why is the Queen in the House of Lords like a florin?
72. When is a baker like a person swallowing Prussic acid?
73. Why is Nelson's memory like genuine French brandy?
74. Why is a rope-maker like a poet?
75. Why is Charles Dickens like a boxer?
76. Why is the washed linen sent home on Saturday?
77. Why is a respectable public-house like an elysium of the gods?
78. Why are the boxes in a theatre like Niobe?
79. Why is a physician's prescription a good article to feed pigs with?
80. Why is a gun like a jury?
81. Why is a busy tailor seldom at home?
82. Why is coffee like a new-made razor?
83. Why is a devout man like a fox?
84. Why is Newgate like a pack of cards?
85. What great commander, after having been killed in an engagement, came home in good spirits at last?

86. What goes from London to York?
87. Who is that lady whose visits nobody wishes, though her mother is always welcome?
88. Who was the greatest man England ever produced?
89. What is that which few like to give away, and yet nobody wishes to keep?
90. Why is a drunken man like a Quaker?
91. Why is a cobbler who has lost his tools like a ruined man?
92. When I raise a fallen man what tradesman do I resemble?
93. Why is a proud woman like a music-book?
94. What word of one syllable is that which, by taking away the first two letters, becomes a word of two syllables?
95. Why is a man in love like a lobster?
96. Why is your nose like the letter V in civility?
97. Why is a bad pen like a wicked man?
98. Why is a horse the most miserable creature in existence?
99. Why are the Venetians a crafty people?
100. Why is Rothschild like a railway?
101. What viand is that which denotes a lean wife roasted, with the ruin of man for sauce?
102. What flower would be best to keep a secret in?
103. Why is Rotterdam like a flat fish?
104. Why is a jolly row like a funny cat?
105. When was Charles II. like a race-horse?
106. Why is a barrister like a beggar?
107. Why is a drawn tooth like a thing forgot?
108. Which of the cardinal virtues will water resemble when quite frozen?
109. Why is a lady in bed like an unbound book?
110. Why does a miller wear a white hat?
111. Why is a soldier in battle like idleness?
112. Where was Peter when the candle went out?
113. Why is Virgil translated like hatred?
114. Why are the letter-bags passing between Edinburgh and Ayr like an eldest son?

115. Why are a deposed monarch and a republican state both in a condition of poverty?
116. What trade never turns to the left?
117. What is the difference between a donkey and a postage stamp?
118. Why do white sheep eat more than black ones?
119. Why should a donkey never be a creditor?
120. Why is a tale-bearer like a bricklayer's labourer?
121. Why is type-setting beneficial to a nervous man?
122. Why is a man riding fast up-hill like another presenting a dog to a young lady?
123. Why is a man in a fever like a candle lit?
124. Why is a dandy like a haunch of venison?
125. Why do pioneers walk at the head of a regiment?
126. Why is your hat, when it is on your head, like a giblet-pie?
127. Why is a man under petticoat-government like a farm-yard with a hen in it?
128. Why would the devil riding on a mouse be like two words of the same meaning?
129. Why was Cook firing on the savages like a person opening oysters?
130. Why is the narrative of the siege of Troy like the top room of a house?
131. Why was Titian's fat daughter Mary like Sir R. Peel?
132. What month do ladies talk least in?
133. Which letter in the alphabet is most useful to a deaf old lady?
134. Why is the Hon. W. Gladstone like a dog with his tail in his mouth?
135. What is the difference between "fish alive" and "live fish?"
136. Why is a man who cannot work like another who does?
137. Why is a feeble old man like a nail driven up to the head in a post?
138. Why is a wall-eye like a note of interrogation?
139. Why is a knock-kneed man the best of friends?
140. What town in Cumberland represents a woman making a wry face?
141. What fruit does a busybody resemble?
142. What snuff-taker is that whose box gets fuller the more he takes?

143. Why are blind men like Plato, Socrates, and Seneca?
144. Why are clergymen unlikely to be impartial critics of theatricals?
145. Why is the letter V like money?
146. Why is a man who is making cent. per cent. in trade like Ireland?
147. What is the difference between a bad potato and a bee-hive?
148. When is a sailor not a sailor?
149. Why are gluttons averse to annual parliaments?
150. Where did Noah strike the first nail in the ark?
151. Why is the letter S like a furnace in a battery?
152. Why is a lover like a crow?
153. Why is a pig with a curled tail like the ghost in Hamlet?
154. What town in Essex is like a noisy dog?
155. Where did Bonaparte stand when he landed at St. Helena?
156. Which is the greatest Friday in the year?
157. What word is that which, when a letter is taken away from it, makes you sick?
158. Why are dissenters like gnats?
159. Why is the eye like a severe schoolmaster?
160. Why is a drunken man like a windmill?
161. Why is a roomful of married folks like an empty room?
162. Why is an impudent fellow like a waterman?
163. Why should bad-coloured peas be sent to Hammersmith?
164. Why is a drunkard like a tanner?
165. Why is a miller a knave?
166. What precious stone is like a door?
167. Why is a placeman like a cobbler?
168. Why is a peach-stone like a regiment?
169. Why is an angry person like a loaf?
170. Why is a dwarf's whole suit like a pair of breeches?
171. Why is a shallow person like a pane of glass?
172. Why is a thoughtful man like a mirror?
173. What fish does a tippler resemble?
174. Why is a man sailing up the Tigris like one putting his father in a sack?

175. Why is a sycophant like the hands of a clock ?
176. What is the longest and shortest thing in the world ?
177. What goes and stands without legs ?
178. Why is a general on horseback like a handsome fan ?
179. Why is the queen like an infant at the breast ?
180. Why is the letter E like an island ?
181. Why is swearing like a ragged coat ?
182. What word of three syllables contains the whole twenty-six letters ?
183. Why is a lady on her wedding-day like a lady in error ?
184. Why is a dyer like a chameleon ?
185. What is the best season to have letters from India ?
186. Why is a policeman like a good conundrum ?
187. When is a crinoline not a crinoline ?
188. Why is a whirlpool like a donkey ?
189. When do two and two not make four ?
190. Why is the letter S like a pert reporter ?
191. When does a sculptor explode in strong convulsions ?
192. Why are hot-house plants like drunkards ?
193. When does a lady drink music ?
194. Why is a man looking for the philosopher's stone like Neptune ?
195. Why is this budget of conundrums like a spoon in a cup of Bohea ?
196. Why is a rook like a farm labourer ?
197. Why are poets like children's toys ?
198. Why is a chicken-pie like a gunsmith's shop ?
199. What is that which every one asks, every one gives, and very few take ?
200. Why is matrimony like a landed estate ?
201. Why is a beggar tying up his garments like a landlord on quarter-day ?
202. Why am lawyers in Congress, Sambo, like fishes ?
203. When is a window like a star ?
204. When was the largest quantity of beef-tea made in England ?
205. Why is the letter S like a Christmas dinner ?
206. Why should Ann be pleased when she is married ?
207. Who dares sit before the Queen without removing his hat ?

208. Why is the keeper of a gin-palace like Jack Ketch?
209. What instrument is like a cutting reply?
210. When does a man swallow a door?
211. What is smaller than a mite?
212. When was Captain Napier like a pot-boy?
213. Which is the largest jewel in the world?
214. Why is a man waiting for his dinner willing to be a martyr?
215. What is the difference between I and U?
216. Why is a prisoner on his trial like one hanging?
217. Why is opening a letter like a new way of getting into a room?
218. What is the difference between a farrier and a safe steed?
219. Why is a man's chin the most unlucky part of his body?
220. Why is the letter N the most sorrowful of letters?
221. What profession expresses both parent and child?
222. Why is a tradesman when a customer calls to pay his account like a horse that starts for one of the races?
223. Why is a lady in her walking-dress in danger of being killed?
224. Why is a glass of gin on credit like a play?
225. What is everybody doing at the same time?
226. Why should shoemakers and milkmen be good sailors?
227. When does a clergyman resemble a person who is correct in what he says?
228. What is the first thing a man does when he falls into the water?
229. What is that which every man can divide, but no man can see where it has been divided?
230. Which is the most celestial part of the British empire?
231. Which is the most foolish portion of the Queen's dominions?
232. Why may Charles I. be said to have connived at his own execution?
233. What comes nearest to an oyster?
234. Why is a lady's *deshabille* like a milkman?
235. Where was the cock that crew so loud that all the world heard it?
236. Why is Birmingham like a Dutch clock?
237. What small American coin does a posted letter resemble?

238. Why is a butcher supposed to be a great traveller ?
239. Why is a felon on the gallows like a nobleman ?
240. Why is a mirror like your conscience ?
241. When is a man thinner than a lath ?
242. Why is a frightened man like one of the Society of Friends ?
243. Why is a dejected man like one thrown from a precipice ?
244. When is a man over head and ears in debt ?
245. When is an insolvent debtor like an actor ?
246. When is wine like a pig's tooth ?
247. What is most like the half of an orange ?
248. Why are clumsy servants like the sea among rocks ?
249. What colour is a field of grass when it is covered with snow ?
250. When is a chimney like a chicken ?
251. When is a schoolboy like a postage stamp ?
252. Why is a butcher's cart like a pair of boots ?
253. Why is a policeman like an auctioneer ?
254. Why is a new-born infant like a donkey's tail ?
255. When is a short prince not a short prince ?
256. When may a man be said to have " gone to the dogs ? "
257. Why is a printer an unfortunate man ?
258. When is a nosegay literary ?
259. What part of the history of Rome would an old lady natural object to read ?
260. Why is Downing-street like a cab-stand ?
261. What are the most disgraceful postures and positions ?
262. When is water like fat ?
263. When is a man like a chimney ?
264. Why is a barrister like a poker ?
265. Why was Addison like a butcher ?
266. What fish is like a nosegay ?
267. Why is Liverpool like benevolence ?
268. Why is a genteel and agreeable young lady like one letter in ~~de~~ thought, another on its way towards you, and another ^{singin'} Psalms ?
269. Why should there be a marine law against whispering ?

270. Why is love like a potato?
271. What parts of speech are shopkeepers most anxious to sell?
272. Why are fixed stars like wicked old men?
273. Why is a man who agrees to another's proposition like one who bestows a small American coin in charity?
274. Why would mackerel make an excellent circulating medium for the Yankees?
275. Why was Sir W. Scott like a boiled lobster?
276. Why is a man who is singing all day like an inhabitant of New York?
277. Which is the dandy amongst the trees?
278. What tree is an officious gossip?
279. What tree would be likely to smoke if water were poured on it?
280. What trees are articles of winter dress?
281. What bush is superior to all others in age?
282. Why may a dealer in black slaves be said to be an habitual swindler?
283. What plant will name the feeling of an ambitious person?
284. Why is summer like the letter N?
285. Why is a tyrannical husband like a chess-player?
286. What dress should a lady have to keep all the rest of her wardrobe clean?
287. Why is Lombard-street like the Grand Canal?
288. When are teeth like verbs?
289. What motive has a fishmonger for calling out loudly?
290. What colours are the winds and storms?
291. What musical instrument makes the most discord?
292. Why is a bottle of brandy like a haunted house?
293. Why is a stingy man like a salmon?
294. Why is Ireland like a bottle of wine?
295. Why are wagers like eggs?
296. Why was the race for the Derby of 1865 like the battle of Waterloo?
297. Which is the warmest, a Turk or a Hottentot?
298. Why is an Irishman turning over in the snow like a mounted policeman?

299. What does a seventy-four weigh before setting sail ?
300. What word of ten letters can be spelt with five ?
301. Why is a leg of bacon uncut like Hamlet in his soliloquy ?
302. Why is a side-saddle like a four-quart measure ?
303. What smells most in a chemist's shop ?
304. Why is it unlikely that an omnibus will be struck by lightning ?
305. What class of people bear a name meaning, I can't improve ?
306. Why is a very angry man like fifty-nine minutes past twelve ?
307. Why is a thief in a garret like an honest man ?
308. What belongs to yourself, and is used by every one more than yourself ?
309. Why is an accepted suitor like a person guilty of a crime ?
310. Why are lazy people's beds too short for them ?
311. Where are balls and routs supplied gratis ?
312. Why are there three objections to taking a glass of brandy ?
313. Why is a tired horse like a benevolent man ?
314. Which are the most difficult wigs for a barber to curl ?
315. Why is a schoolmistress like the letter C ?
316. Why are washerwomen often deceived ?
317. Why is a man who wears a watch never punctual ?
318. What kind of a harp did David play on ?
319. Why is a whisper like a counterfeit bank-note ?
320. Why is a person making a conundrum like a dog's tail curled ?
321. When does the red-deer change colour ?
322. Why is a thief called a " jail bird ? "
323. What corns are the least troublesome ?
324. Which three letters are of most use ?
325. Why are crows sensible birds ?
326. When is a clock on the stairs dangerous ?
327. When is a miller like a fast eater ?
328. What kind of paper most resembles a sneeze ?
329. When does a man seem like a cannon-ball ?
330. When does beer become eatable ?
331. What things increase the more you contract them ?
332. Why ought a horse not to be hungry on a journey ?

333. When are boots like blossoms ?
334. What relation is the door-mat to the scraper ?
335. When do trousers become a girl ?
336. When is a rose like a book ?
337. Which side of a horse is the easiest to get on ?
338. What chapel is that which has a church in it ?
339. Why should musical instruments pay extra insurance ?
340. Why is the letter W like a busybody ?
341. Why has a greedy man a short memory ?
342. Why does a duck put its head under water ?
343. Why is a man who never gambles as bad as one who does ?
344. Which was the most formidable stand made for liberty ?
345. When is a lady's dress like a chair ?
346. Why is a coquet like Cupid ?
347. Which is the best way for a girl to take pills ?
348. Which of Shakspeare's characters suits a squinting man ?
349. Why are barristers religious ?
350. Why is a merry fellow like a bad shot ?
351. Why is St. Paul's like a bird's nest ?
352. Why is troy-weight dishonest ?
353. Who was the oldest woman ?
354. When is a lady's neck dangerous ?
355. What is higher when its head is off ?
356. What faction ought to be uppermost ?
357. Why is a bad horse like a bad play ?
358. What is a muff ?
359. What is the only thing that can live in fire ?
360. Why cannot a railway engine sit down ?
361. What will give a cold, cure a cold, and pay the doctor when cured ?
362. Why is a courteous person like a tree ?
363. Why is a jailor like a musician ?
364. Why is money like a whip ?
365. Why is the remainder of a leg of mutton like Windsor ?
366. Why is going to the play like last week ?

367. Why are glaziers greater sufferers than other people ?
368. Why is a blunt knife like wheat ?
369. Why do ladies wear clogs ?
370. Why is a parasite like a pair of spectacles ?
371. When you go to bed, why are your slippers like a thing delayed ?
372. Why is a man who spoils his children like one who builds castles in the air ?
373. What is the difference between an engine-driver and a school-master ?
374. What is a man like in the midst of a desert, without meat or drink ?
375. Why is thought like the sea ?
376. Why is a plant after flowering like an old coat ?
377. Why is a bad song like the Thames Tunnel ?
378. When is a policeman like a Samaritan ?
379. When you put on a stocking, why are you sure to make a mess of it ?
380. What makes everybody sick but those who swallow it ?
381. Why is a schoolboy who is beginning to read like learning itself ?
382. What question is that to which you must answer Yes ?
383. Why is venison more costly than other meat ?
384. Why is a dog like a tattling person ?
385. What is that which is always invisible, yet never out of sight ?
386. Why is a brunette's face like a wet day ?
387. Why is a good story like the parish bell ?
388. What is majesty robbed of externals ?
389. Why does a gardener have more wages than other people ?
390. Why is a bad epigram like a poor pencil ?
391. How can we increase an effect by diminishing the cause ?
392. On what side of a church does the yew-tree grow best ?
393. If a tough beef-steak could speak, what poet would it name ?
394. If a pair of spectacles could speak, what ancient historian would they name ?
395. If you throw a man out of the window, what does he fall against ?

ANSWERS TO CONUNDRUMS.

1. Because a queen's head wasn't worth a penny.
2. When it's a cutter.
3. When due (*dew*) in the morning and missed (*mist*) in the evening.
4. Because he stands over six feet without shoes or stockings.
5. Because he has been to sea (*see*).
6. The clock; it always covers its face with its hands and runs itself down however good its works may be.
7. *A bill* sticker.
8. There is no living without them.
9. Because it makes a-sty nasty.
10. PIG, without the eye (I).
11. The difference of a (o)pinion.
12. Because they never had a nap.
13. When they break fast.
14. It's the grub that makes the butterfly.
15. Because it isn't current.
16. Because he makes people *steel* pens and says they do write.
17. They are forage (*for-age*).
18. He can never lie *long* in bed.
19. When it is leaky (*leaky*).
20. A fowl (*foul*) wind and then a chop.
21. The nose would soon be blowed, but the eyes would run till they dropped.
22. Because you can see from pole to pole.
23. When you put it in your pocket you double it, and when you take it out you find it in-creases.
24. Before U and I were thought of.
25. O ! Bacchus.
26. The Brighten-up train.
27. Guy Fawkes.

28. Stone.
29. Courtship.
30. One kills to dress, the other dresses to kill.
31. She sews that she may reap.
32. O B C T (obesity).
33. Because he's sooted (suited).
34. Beda.
35. Because it can never be-long to him.
36. One uses wax candles, the other dips.
37. Because they are made out of nothing and are all very good
38. Water finds its own level, but time levels all things.
39. Cork.
40. One is true, the other a lie, sir (Eliza).
41. The rose of the watering-pot—it *rains* over all the others.
42. It has been receipted (re-seated).
43. They steel their petticoats and bone their stays.
44. It makes one smart.
45. Silence.
46. For every grain they give a peck.
47. He is an ass.
48. It is soon exhausted.
49. It cuts as well as shines.
50. It takes part in everything.
51. There are spades in it.
52. Short.
53. A mare's.
54. To-day.
55. A ditch.
56. It is bad for the constitution.
57. He is full of boughs.
58. He is put to the rack.
59. It is refunded.
60. He is a thyme keeper.
61. It is chequered.
62. It is holy.

63. They are in arms.
64. Monosyllable.
65. To die.
66. She was one and he was a cipher.
67. They are made to be kept on hand.
68. It is vane to a spire.
69. Wet.
70. He kneads.
71. She is under a crown.
72. When he's filling his bread-basket for the last time.
73. It is *dear* to the British nation.
74. He makes lines.
75. He makes good hits right and left.
76. It is the close (clothes) of the week.
77. No bad spirits enter it.
78. They are in tiers.
79. It is composed of grains.
80. It goes off when discharged.
81. He is often cutting out.
82. It must be ground before using.
83. He prays (preys).
84. It contains knaves.
85. Nelson.
86. The road.
87. Mis-fortune.
88. Daniel Lambert.
89. Their bed.
90. The spirit moves him.
91. He has lost his awl.
92. An up-holder.
93. She is full of airs.
94. Plague—ague.
95. He has a lady in his head.
96. It is placed between two i's.
97. It wants mending.

98. He likes to be on the rack and his greatest comfort is wo (woe).
99. They have had many dodges (doges).
100. Draw as long as you like upon him he will not feel it.
101. A spare-rib and apple sauce.
102. In violet (inviolate).
103. It is a Dutch plaice.
104. It is a rum puss.
105. When he ran for the Oaks.
106. He pleads.
107. It is out of the head.
108. Just-ice.
109. She is in sheets.
110. To cover his head.
111. He is in-action.
112. In the dark.
113. It is a version.
114. It is the Ayr mail (heir male).
115. One has lost his last crown, the other has not a sovereign.
116. A wheel-wright.
117. One is licked with a stick, the other is sticked with a lick.
118. Because there are more of them.
119. He never gets anything in the pound.
120. He fetches and he carries.
121. It is composing.
122. He is giving a gal a pup (gallop up).
123. He is light-headed.
124. He is a bit of a buck.
125. To axe the way.
126. It has a goose's head in it.
127. He is hen-pecked.
128. It would be sin-on-a-mouse (synonymous).
129. He was astonishing the natives.
130. It is an attic story.
131. She was a great Polly Titian.
132. February ; it is the shortest.

133. A ; it will make *her* hear.
134. He makes both ends meet.
135. There is *a* difference.
136. One is not able, the other notable.
137. He is in-firm.
138. It is a queer eye (query).
139. A friend in-kneed is a friend indeed.
140. Cockermouth.
141. A medlar.
142. A pair of snuffers.
143. They feel loss of eyes (philosophize).
144. They take orders.
145. It is in-valuable.
146. His capital is doubling (Dublin).
147. One is a spectator the other a bee-holder.
148. When he's a-board.
149. They object to short commons.
150. On the head.
151. It makes hot, shot.
152. He has an attachment to carry on (carrion).
153. It can a tail unfold.
154. Barking.
155. On his feet.
156. Shrove Tuesday.
157. Music.
158. They are in-sects.
159. It has always a pupil under the lash.
160. His head turns round.
161. There is not a single person in it.
162. He puts in his oar.
163. It is the way to turn-'em-green.
164. He soaks his hide.
165. He is a rogue in grain.
166. A-gate.
167. He sticks to the last.

168. It has a kernel (colonel).
169. He is crusty.
170. They are small clothes.
171. He is easily seen through.
172. He reflects.
173. A wet sole.
174. He is going to Bag-dad.
175. He is time-serving.
176. Time.
177. A clock.
178. He is well mounted.
179. She can do no wrong.
180. It is in the midst of the sea.
181. It is a bad habit.
182. Alphabet.
183. She is miss-taken.
184. He changes colours.
185. That which brings the monsoon (them-on-soon).
186. You must look sharp to find him out.
187. When it becomes a lady.
188. It is an eddy (a neddy).
189. When they stand for twenty-two.
190. It begins and ends in sauciness.
191. When he makes faces and *busts*.
192. They have so many glasses over and above.
193. When she has a piano-for-te.
194. He is a see-king what never was.
195. It is in-te-resting.
196. He gets his grub by the plough.
197. They are given to a-muse and indulge in-fancy.
198. It contains fowl-in(g)-pieces.
199. Advice.
200. It is a proper-tie.
201. He is collecting his rents.
202. Dey are so fond of de-bate.

203. When it's a sky-light.
204. When Harry the Eighth dissolved the Pope's bull.
205. It comes before T.
206. She is animated (*Annie mated*).
207. Her coachman.
208. He gives people their drops.
209. The retort.
210. When he bolts it.
211. Its mouth.
212. When taking Beyroot (*beer out*).
213. The Emerald Isle.
214. He is ready for his steak (*stake*).
215. Eleven letters.
216. He is in a state of suspense.
217. It is breaking through the ceiling.
218. One is a horse shoer, the other a sure horse.
219. It is often getting into scrapes.
220. It is always in-consolable.
221. Pa-son (*parson*).
222. He runs for the ledger (*Leger*).
223. She has a boa round her neck.
224. It is dram-o'-tick (*dramatic*).
225. Growing older.
226. They are both used to the pumps.
227. When he's a curate (*accurate*).
228. He gets wet.
229. Water.
230. The Isle of Skye.
231. The Scilly Isles.
232. They axe'd him whether or no.
233. The shell.
234. It is a morning (*w*)rapper.
235. In Noah's ark.
236. It is full of works.
237. One cent.

238. He has been all over Greece.
239. He is raised above the common people.
240. It reflects.
241. When he's a shaving.
242. He is a Quaker.
243. He is cast down.
244. When his wig is not paid for.
245. When he takes a benefit.
246. When it is in a hog's-head.
247. The other half.
248. They are breakers.
249. Invisible green.
250. When it is a little foul.
251. When he gets licked and put in the corner to make him stick
his letters.
252. He carries his calves in it.
253. He is given to knocking down.
254. It was never seen before.
255. When his lowness is his highness.
256. When he is rolled in the kennel.
257. He is doomed to the galleys.
258. When its a book, eh? (bouquet).
259. The history of her decline and fall.
260. Because it has a cab-in-it.
261. Im-postures and im-positions.
262. When it is dripping.
263. When he is smoking.
264. He is often at the bar.
265. He was seldom without his *Steel* by his side.
266. One smelt.
267. It is founded on mercy (Mersey).
268. A-musing, B-coming, D-lighting, N-chanting.
269. It is a private hearing (privateering).
270. It springs from the eye.
271. Articles.

- They scin-til-late.
He gives assent (a cent).
They are green-backs.
He was deep read (red).
He is in a merry key (America).
The spruce-tree.
The medlar.
The lime.
Furze.
The elder.
He never makes a fair bargain.
Ivy (I vie).
It renders ice nice.
He aims to *check-mate*.
A laun-dress.
It has banks on both sides.
When they are regular, irregular, and defective.
A selfish one (sell fish).
The storms rose, the winds blew.
A lyre.
It contains spirits.
He is scaly.
There is a Cork in it.
They are laid.
The French ran first.
The Turk is the Ottoman.
He is pat-rolling.
Her anchor.
Expediency (X P D N C).
It is Ham-let alone.
It holds a gal on (gallon).
The nose.
Because it has a conductor.
Mendicant (mend I can't).
He is just ready to strike one.

307. He is above doing a bad action.
308. Your name.
309. He should be transported.
310. They are too long in them.
311. On the field of battle.
312. There are three scruples to a drachm.
313. He stops at the sound of whoa (woe).
314. Earwigs.
315. She forms lasses into classes.
316. They expect to catch soft water when it rains hard.
317. He is always behind time.
318. A Jew's harp.
319. It is uttered, but not allowed.
320. He is bent on being waggish.
321. When the fawn turns to bay.
322. He has been a robin (robbing).
323. Acorns.
324. A Y Z (a wise head).
325. They never complain without cause.
326. When it's running down.
327. When he bolts his meal.
328. Tissue paper.
329. When he looks round.
330. When it's a little tart.
331. Debts.
332. He has always a bit in his mouth.
333. When on trees.
334. A step-fa(r)ther.
335. When they are a miss-fit.
336. When the leaves are read.
337. The outside.
338. Whitechapel.
339. The engines cannot play upon them.
340. It makes ill-will.
341. He is always for-getting.

342. For divers reasons.
343. He is no better.
344. The inkstand.
345. When it is sat-in.
346. She keeps her beau (bow) in a quiver.
347. In cyder.
348. Lear—with a strong cast.
349. They adhere to the law and the profits (prophets).
350. He keeps the game alive.
351. It was built by a Wren.
352. It has no scruples.
353. Ann Tiquity.
354. When it is a little bare (bear).
355. A pillow.
356. Satisfaction.
357. It will neither run nor draw.
358. A thing that holds a lady's hand without squeezing it.
359. A live coal.
360. Because it has a tender behind.
361. A draught (draft).
362. He is full of boughs.
363. He fingers the keys.
364. It makes the mare to go.
365. It is near eaten (Eton).
366. It is pastime (past time).
367. They have more pains (panes).
368. It should be ground before using it.
369. To save their soles.
370. He magnifies small things.
371. They are put off till next day.
372. He indulges in-fancy too much.
373. One minds the train, the other trains the mind.
374. Like to be starved.
375. It is a notion (an ocean).
376. It is seedy.

377. It is a great bore.
378. When he comes out of some area (Samaria).
379. You put your foot in it.
380. Flattery.
381. He *is* learning.
382. What does Y E S spell?
383. It is always dear (deer).
384. He is a tail (tale) bearer.
385. The letter I.
386. It is not fair.
387. It is often told (toll'd).
388. A jest.
389. His salary (celery) is raised every year.
390. It has no point.
391. By snuffing the candle.
392. The outside.
393. Chaucer (Chaw, sir).
394. Eusebius (You see by us).
395. His inclination.



ENIGMAS.

1. My first is the first of its kind,
That tends to enlighten the mind ;
My second, in French, names that Power
Which raises and waters each flower ;
But you never can mention my whole
Without wounding me to the soul.
2. I am small, I am slender, as light as a fly,
And yet all the strength of your fingers defy ;
For weak as you think me, such power have I,
I can tie such a knot as you cannot untie,
Though if any knew how, there are many would try.
3. Take a thousand and one,
And when that is done,
Set an hundred besides them at twice ;
And then if you look
There is what's o'er the brook,
And the rebus is solv'd in a trice.
4. Few things than the sight of my first are more frightful,
But the sight of my second is clean and delightful ;
The one with the wretched is always in mind,
The other much praised by the poets you'll find ;
Unlike as they are, being joined, they set forth
A town of much note and much trade in the north.
5. My first is a term which in music is found,
My second a weapon our forefathers used,
My whole will discover a poet renown'd,
By whose numbers I'm often amused.

6. My first most folks say is hard to be found,
My second's a thing of great use,
My whole will disclose a passion renown'd,
Which often has met with abuse.
7. I am, you'll think, a paradox or worse,
A friend, a foe, a blessing, or a curse;
I'm much admired by housewives and by cooks,
And oft by farmers curs'd with crabbed looks;
So that my presence, and my absence too,
Are both desired, and that by not a few;
Famine and plenty, too, I cause, 'tis plain,
And am an antidote as well as bane;
The nuptial noose I can dissolve with ease,
And have the heart to please and to displease;
The fairest ladies' lips (what harm in this,
Since by their leave?) I oft presume to kiss,
Assist in dressing them both night and morn,
And their dear persons charmingly adorn;
I'm overbearing and subservient both,
Though to submit sometimes I seem so loath;
When I'm most useful, then I'm least regarded,
And though I suit all tastes, by some discarded;
Useful, destruction, death; of health the fountain,
A fluid, solid, valley, and a mountain;
Hot, cold, uneven, smooth, rough, hard and soft,
And where in greatest plenty, wanted oft;
In me of miracles the subject's seen,
Of armies, too, the overthrow I've been;
I've caus'd, in short, to end this tedious lecture,
In all the world the finest architecture.
8. My first is what some men will take
Entirely for my second's sake;
But both together all declare
Is more than mortal man can bear.

1. My first is a destructive weapon, my second may be found in the dressing of most beaux, and my whole is formed for my first.

My first does affliction denote,
Which my second is destin'd to feel ;
My whole is a sweet antidote,
With affection to soothe and to heal.

Madam, one thing of you I crave,
'Tis what I'm sure you cannot have,
Nor ever had in ages past,
Nor ever will while time shall last ;
Yet as I love you as I say,
Pray give it me without delay.

What could man do without my aid ?
Or what each fair industrious maid ?
I lead the first o'er sea and land,
The second takes me by the hand,
Presses me close with care and skill,
And makes me do whate'er she will ;
I cannot boast of many charms,
I've neither feet, nor legs, nor arms,
But all agree I have an eye,
So fine, it may with beauty vie ;
I fear I many wounds impart,
Shed blood, but never touch the heart ;
They who would contemplate my end
(For that's the point where I offend)
Sharply to look about must mind,
Or me much sharper they will find.

My first is oft a dirty thing,
My second is the end on't,
My whole's like many a poor wise man,
Oft on a foot dependent.

14. The moon when nine days old,
 The next sign to Cancer,
 Pat, rat without a tail—
 Now, sir, for your answer.
15. No more than nine letters make up my whole length,
 But my first five are aye getting longer,
 The remainder is very much noted for strength—
 Do you think you can make out the wonder?
 My whole is a singular state of the mind
 That occurs very oft in my first,
 And is not particularly agreeable you'll find,
 As you fain would cry out, if you durst.
 "
16. I oft at your table appear,
 And am placed by the side of your fish ;
 I always am cut when I'm there,
 Yet no one to taste me would wish.
17. An insect of the smallest size,
 If you transpose it rightly,
 Will show what all men ought to prize,
 Tho' valued by them slightly.
18. My first is an accommodation, my second what a man's
value, my third a grain of the field, and my whole a little
industry.
19. My first you must follow, whatever your haste,
 In my second a poet you view ;
 My whole, if worn and selected with taste,
 May be envied and ornament you.
20. I once was my first, tho' 'tis some time ago,
 And you, gentle reader, have been the same too ;

For my next, if you find yourself puzzled to know it,
Half London, I'm sure, will come forward to show it;
My whole, in her strength, tower'd high above all—
What a warning for pride is her desolate fall!

21. In almost every house I am seen,
 No wonder then I am common—
I am neither man, nor maid, nor child,
 Nor yet a married woman.
I am penniless, and poor as Job,
 Though such my pride by nature,
I always wear a kingly robe,
 Though a dependent creature.
22. My first is in winter a warmth you desire,
 My second is cold to the touch,
Both together are cold, yet appear all on fire,
 Which has puzzled philosophers much.
23. At the rise of my first, my second begins,
 On my whole we are told to repent of our sins.
24. My first is for falsehood and flattery renowned,
 My second's endanger'd by touching the ground,
My whole is the happiest time of our lives,
 Be candid and own it, ye husbands and wives.
25. I'm used by almost every one,
 Whate'er his occupation,
By me the men in Parliament
 Are sure to rule the nation.

By taking me, friend Crispin lives,
 As well as every tailor,
The milliner could not do without,
 And sometimes not the sailor.

The publican, the grocer, too,
As well as every draper,
The music-master, without me,
Were nothing but a scraper.

Forgive me, if in this I'm not,
For writers oft abuse me,
Yet they ought not, for poets all
In composition use me.

26. My first is a right merry fellow,
My second is part of his wig,
My whole is the name of a bird,
Seen nearer the stream than the twig.

27. A freedom-making friend of mine
Once called at my first with me to dine,
And after staying all the day,
Had impudence enough to say,
That if I should not feel much vexed,
He would be proud to do my next :
Well, this he did, and drank, alas !
Of my good third full many a glass ;
Yes, bottle followed bottle and
He scarcely was my last to stand ;
Then, troubled to my inmost soul,
I found he had become my whole.

28. Complete I'm a city—a seaport as well,
And many long furlongs to eastward I dwell ;
To me from all provinces merchants will hie,
To barter their goods, to sell and to buy :
So much for my whole ; but now curtail my name,
And poetry I wing to the annals of fame ;
Curtail me again, and my smooth wheedling tongue
Well merita th' aversion that on it is flung.

Now friends, I pray, can't you say what I am ?
 You can't? then curtail me again and you can.

29. Though I'm small, yet when entire,
 Enough to set the world on fire ;
 Let but a letter disappear,
 And I enclose a herd of deer ;
 Omit another and you'll find
 I once enclosed all mankind.
30. There's a word of two syllables whose meaning implies
 What all should abstain from who're prudent and wise ;
 The contrast is great, for reversed it will show
 What all folks on earth are most anxious to do.
31. 'Twas heard in the very last breath of the wind ;
 'Twas felt in the deepest extent of the mind ;
 It drops with the doctor when drunk to the ground ;
 It pierced with the sword to the depth of the wound ;
 Longer time than the sword it remained in the side ;
 Extracted with that, with this 'twill abide :
 It was placed in the dungeon alone with the debtor,
 But endurance remained when he 'scaped from his fetter :
 'Twas found in the deep, and to lords is allied,
 And when they are dead it exists in their pride :
 I believe that it first was discover'd by Adam,
 But by transmigration it soon came to Madam :
 With delight it remains from the last to the first,
 And when we are dead 'twill be mingled with dust :
 With the doctor it dances, and is doubled in dead,
 With the drunkard it drinks, with your daughter is wed :
 The peasant, unwilling its fame to resign,
 As a mark of distinction will add it to wine :
 With the dog in the dark your house he'll defend,
 It dieth with death, yet exists to the end.

32. A monosyllable I am, and a reptile, I vow,
Yet cut me in half I am syllables two;
I am Latin, I am English, the one and the other,
What's Latin for one is English for 't'other.
33. Mrs. Thicket with her one eye
A prodigious tail lets fly,
And as she whips through every gap,
Leaves a part of her tail in the trap.
34. Slain to be saved, with much ado and pain,
Scatter'd, dispers'd, and gathered up again,
Wither'd when young and sweet, yet unperfum'd,
And carefully laid up to be consum'd.
35. My first is the head of my second, no doubt,
My whole lies in Hampshire, so pray find it out.
36. My first with martial front doth awful bear
The ruthless aspect of destructive war;
My next, the deadliest foe of human race,
Slow marches on with dread, determin'd pace;
Yet is my whole, when jarring contests cease,
The tie of compact, and the bond of peace.
37. My first is myself in a very short word, my second is a plaything,
and you are my third.
38. My first I adore, my second I renounce, and my whole I celebrate.
39. You cannot do my first at noon, and should you take too much of
my second, you would want my whole.
40. My first is an attendant, my second an insect, and my whole a show.
41. My first denotes a company, my second shuns a company, my third
rouses a company, my whole puzzles a company.
42. In the whisper of lovers it holds the first place,
Though it flies from each love, and abandons each grace :

In America's war-whoop how loud is its cry !
Yet from battle its practice is ever to fly :
With wealth it can sit on the sofa at ease ;
Yet with want it despairs not to lie on its knees :
It leads on the warrior against the foe's charge,
Though the lance it abhors, and affects not the targe :
It mounts on the wings of the furious wind,
Though to storm and to hurricane never inclin'd :
In the maze of the world you its presence descry,
For it sits in the wrinkles of Tabitha's eye :
It lives in the whirlwind of fashion ; fulfils
Its part in the waltz, yet abandons quadrilles :
It affecteth the old modes of fashion, and wears
Its design in a wig, 'stead of natural hairs :
With the sword yclept dress worn at court, as the *ton* is,
It cuts a gay dash *comme les beaux macaronis* ;
But sooth 'tis not seen in the great aristocracy ;
Nor eke 'mid its opposite, sturdy democracy :
It seeks not the Queen, nor the Church, but the law
Hath its strength in the end ; it delights in a flaw :
But yet in the court it doth never preside,
Full sooner 'twould sport on the watery tide :
From Britain it lies, yet its seat is in Wales :
It exists in the world, yet in nature it fails :
In life it is not, for it has not a breath ;
Yet it is not extinct, for it is not in death.

43. Am I able to tell you the word which I mean ?
 'Tis done,—nothing more need be said ;
Believe me the word is as easily seen,
 And as quickly as this may be read.
But lest you should wander for want of a clue,
 My first is a part of to be ;
My second, though never belonging to you,
 Is appropriate always to me ;

My third is an emblem of power and might,
 And wisdom and strength it implies ;
 Should you be my third, with much eager delight
 You would haste to remove my disguise.

44.

Fifty forms my first,
 But nothing is my second ;
 Five just makes my third ;
 My fourth's a vowel reckoned.
 Now, to fill my whole,
 Put all my parts together ;
 I die if I get cold,
 Yet never mind cold weather.

45.

Dear is my first, when shadowy night is near ;
 But 'tis my second makes my first so dear ;
 My whole with decent care my first preserves,
 And thus to be my second well deserves.

46.

My first is a movement that's light,
 My second's a mere strip of leather,
 My whole, if I now guess aright,
 Is composed of three vowels together.

47.

If you were my first, and I were my whole,
 My second might go where he'd please ;
 Then I should be blest, and you'd be caress'd,
 And the rest of our lives pass in ease.

48.

Devoid of my first how imperfect the head ;
 In my second, what myriads are nurtur'd and fed !
 But lest you my whole should too easily smoke,
 I will only just say, that 'tis really no joke.

My first is a blow of so gentle a kind,
 None ever resent it or bear it in mind ;

My next is a scene of confusion and strife,
And the actors therein often forfeit their life ;
My whole, with unshaken integrity crown'd,
Is seldom, alas ! in these days, to be found !

50. My first at tea we always do,
 When at it we preside ;
My next is at the table too,
 Whatever else' betide ;
My whole is done whene'er we paint
 Or at description try ;
And sure this covering is too faint
 To veil it from our eye.
51. What the single wish for,
 And the married prize,
What the earth produces,
 And the grave supplies :
Join these together, and you'll see, with ease,
 A vexing, tiresome, juvenile disease.
52. Were my first taken from me I could no longer move in society,
Were my second added to me I should be a most uncommon
variety ;
If I chose my whole for a residence I should be an alien and a
stranger,
And such a step might make my friends conclude my wits in
danger.
53. Flee from my first when tempests howl,
 Keep my next when you mount a steed,
Else you may perhaps require my whole,
 And be glad of his help in time of need.
54. Sweet season when cares are knit up like a sleeve,
My first ever welcome to grief and fatigue ;

A small preposition my second appears ;
My third in wild fury awakens our fears ;
My whole, in vain contest, once yielded her breath,
And she fell from her station harmonious in death.

55. My first is composed of rain and snow,
 My second of flesh and blood,
 My whole of leaves and berries ;
 With a very small portion of wood.
56. My first is a measure by no means uncommon,
 My second a weight that three letters express ;
 My whole, an attendant on each man and woman,
 Forms a requisite part of our dress.
57. My first and second make, combined,
 The pleasure of a soul refined ;
 But should my second take my first away,
 My whole, though strange, will suffer no decay.
58. We are a score, nay, sometimes more,
 Within a cave reside ;
 Though seldom we e'er disagree,
 We very oft divide :
 If we fall out, it is a doubt
 If e'er we meet again :
 Both *beau* and *belle* our worth can tell,
 Yet sometimes cause 'em pain :
 In white array, the ladies gay
 In mirth will often show us :
 From what is said we are afraid
 You will too quickly know us.
59. A marble wall, as white as milk,
 Lined with a skin as soft as silk ;
 At length, a golden ball appears,
 Bathed in a flood of crystal tears :

- No entrance in, no gates unfold,
Yet thieves break in and steal the gold.
60. A word there is not very rare,
And read both ways the same,
Which oft is used to address the fair,
I pray you tell its name.
61. My first is a place where no promises bind,
My second depends on the breath of the wind ;
My whole is more fickle than friendship or weather,
And the maid who trusts to me relies on a feather.
62. There is a word, of plural number,
Foe to peace and tranquil slumber;
Add but to this the letter S,
And strange the metamorphose is ;
Plural is plural now no more,
And sweet what bitter was before.
63. I am the daughter of earth and water,
And the nursling of the sky ;
I pass through the pores of the ocean and shores,
I change but I cannot die ;
For after the rain, when with never a stain
The pavilion of Heaven is bare,
And the winds and sunbeams, with their convex gleams,
Build up the blue dome of air,
I silently laugh at my own cenotaph,
And out of the caverns of rain,
Like a child from the womb, like a ghost from the tomb,
I arise and unbuild it again.
64. When I my first too often wish to take,
My second then is apt my first to break ;
Which renders me so glum, so dull and mute,
That, like my third, I grow a sulky brute.



ANSWERS TO ENIGMAS.

- | | |
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| 2. Wedding ring. | 25. A measure. |
| 3. Mill. | 26. Wag-tail. |
| 4. Liverpool. | 27. In-sup-port-able. |
| 5. Shakespeare. | 28. Can—Cant—Canto—Cantor |
| 6. Friendship. | 29. Spark—Park—Ark. |
| 7. Water. | 30. Evil—Live. |
| 8. Miss-fortune. | 31. The letter D. |
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| 10. Woman. | 33. A needle and thread. |
| 11. Wife. | 34. Hay. |
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| 13. Pigtail. | 36. Host-age. |
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LONDON: PRINTED BY WILLIAM CLOWES AND SONS, STAMFORD STREET
AND CHARING CROSS.





